JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Advertise London——Now!

THE business of the gas industry has progressed magnificently; but the volume of its business would have been much greater than it is had competition not assailed it. Economy, efficiency, and other good qualities may be on the side of one commodity; but there are still people who, for other reasons, will give their preference to the competing commodity. We cannot help feeling, however, as we come into closer and closer contact with the public ignorance that exists as to the advances that gas has made in lighting (not to mention other uses for the moment) that a considerable part of the lighting business that has been lost has been due to the inadequate information of the public. Perhaps there is some consolation in the knowledge that a goodly proportion of the loss was incurred prior to gas lighting reaching the stage of the perfection of to-day. But ignorance still abounds; and upon that ignorance there must be a strong and restless attack. It is for the gas industry to see that no opportunity is lost in this direction. There must be a care that knowledge of the excellencies in economy and efficiency of gas lighting in its modern forms is propagated in an effective manner. Let this be clearly understood, that the electricity supply industry (as represented by central stations) only lives, in the greater proportion of our cities and towns, through the revenue obtained, by the charge made per unit, from those who use electricity for lighting. The lighting load is the mainstay of most concerns. This can readily be seen by taking the proportion of revenue derived from electric lighting and that derived from other sources, and comparing the figures with the volume of business respectively represented. Therefore, public education as to the modern advances of gas lighting is especially necessary.

London is going to be this year the country's and the Empire's—in fact, the world's—chief point of attraction; and the gas industry has already centred in the Metropolis this year worthy displays of its triumphant progress. These two facts taken together are suggestive. To-day we give an account of the display that the Gas Companies' Joint Exhibit Committee are making at the Coronation Exhibition; the other week we were describing an unprecedented (in such a space, and at such a place) installation of high-pressure gas lighting at the Festival of Empire Exhibition at the Crystal Palace, and of the largest demonstration that has yet been made in this country of the use of town's gas with high horse-power engines (two 1000, and one 750 H.P.) for the generation of electricity for traction and lighting purposes. The gas industry knows, if the general public does not, of the large installations in London now of high-pressure and low-pressure inverted lamps for street lighting, and of the considerable demonstrations of parade high-pressure lighting to be found north, east, south, and west. Gas, too, is going to take a part in the Coronation illumination displays. It is estimated by Mr. J. Pain (of the well-known firm who are associated with occasions of public festivity and rejoicing) that about one-third of the illuminations that his firm are carrying out will be by means of gas; one extensive installation being that of the illumination of London Bridge—great festoons of gas-lights ending in candelabra being the scheme. For this a 4-inch gas-main is being specially laid. Electricity is receiving a good amount of patronage for this purpose on account of its convenience; but big installation prices are mentioned in connection with some of the schemes that are being executed for wealthy establishments. Besides comparatively low installation cost for gas, we have expert opinion that with gas a greater effect can be obtained in illumination work than by electricity. In an article last Tuesday in the "Daily Telegraph," on the subject of the Coronation illuminations, the following passages occurred:

> Another gentleman, the head of an establishment which has devoted very many years to this class of work, while admitting the convenience of electricity, declared that for effect gas was by far the better. No device had yet been put on the market by which to produce the glittering and flickering effect which was caused by even the softest of breezes upon an open gas-jet. "We are," he said, "using both gas and electricity in the illuminations which we are carrying out; but if I had my way there would be nothing but gas as the illuminant. . . . To my mind electric lights are too steady and fixed—what we call 'dead lights.' . . . For public illuminations nothing, in my opinion, can compare with gas. I quite admit the extra trouble in lighting up; but I can only say it is worth it."

It will be seen that London, with all its special attractions this year, supplies an extraordinarily good educational centre for the gas industry. The Metropolis will be crowded by visitors from all parts of the country; and it seems to us that gas undertakings in the suburbs and provinces might do worse than advertise prominently in their local papers something to this effect: "Visitors to London should not "fail to see the large exhibit of modern gas lighting, heat-"ing, cooking, power, and laundry appliances, at the Coro-"nation Exhibition; the majestic high-pressure gas display "and the gas-driven electricity plant at the Festival of "Empire Exhibition at the Crystal Palace; the high and "low pressure inverted gas lighting in the streets of the "West-end; and the beautiful effects obtained by gas in "the Coronation illuminations." An announcement of the kind would, at any rate, make some change in the ordinary advertising matter inserted in the local papers. The wording could be altered, extended, and displayed to give it all the prominence that the fancy of the responsible officials of the gas undertakings dictates. In the London papers, announcements of the same kind ought to appear. The Gas Companies' Joint Exhibit Committee would like to have funds [who will provide them?] placed at their disposal for advertising the exhibit at the Coronation Exhibition; and we do not see the slightest reason why there could not be some arrangement with them for a composite advertisement, indicating what there is to be seen in London in the way of gas displays this year. In this matter, there are common industrial interests to be served—and to be paid for. However, these are only suggestions.

There are a few words to be said about the exhibit at the Coronation Exhibition. The Committee (the membership of which has, it will be seen by our article elsewhere, been extended) have done well for the gas industry in organizing this display. It is the best they have yet accomplished; and this was made possible by the larger space they have been able to annex, through the contributing companies. It is a live exhibit. Everything on view in connection with gas appliances is of the most modern and attractive form. Inverted gas-burners, artistic fittings, beautiful globes, and charming shades, and high-pressure lamps are all there. Switch lighting and extinguishing are demonstrated. Gas-fires, in great variety, and with choice enamelled casings, are seen; predominant among them being the long fuel, barless (or almost barless) fires, with in the former case various expedients for retaining the fuel in position. Nearly all the gas cookers and ranges shown have their conveniences enhanced by the provision of plate-racks, back wall-protecting screens, in some cases hoods. Water heating by gas has great attention paid to it. A working laundry, where gas-machine and hand work by gas-heated irons proceeds, is a magnetic force in the display. There are the running gas-engines and gas-compressor, and also a model conservatory heated by gas. In short, the display shows how from palace to cottage and to the motor house and stable all the lighting and heating requirements can be performed economically and efficiently by gas. Having such a range, there is no ordinary purpose of lighting and heating that cannot be met by gas. It would be a pity for any part of the advantage of the displays in London to be lost this year by insufficient publicity. Then, advertise!

A Glance at the Work of the Société Technique.

The meeting of the Société Technique this year, held under the presidency of M. Henri Marquisan, appears to us to be notable for more than one reason. There is very decided evidence of the Society bursting out into fresh life, and pursuing with vigour new work in several directions. There is no question about it, the members have resolved that their organization shall expand in its serviceability to the gas industry; and they have indeed every encouragement to make it of the maximum use. It is observed that in their case the gas companies of France contributed last year a sum of £1146 for the prosecution of work; and we know how largely the German gas undertakings assist in the financing of the activities of their central technical organization. The report of our own Institution—we are almost disinclined to make the comparison—shows that the Special Purposes Fund last year received contributions amounting to only £356 18s. 6d., which looks paltry in comparison with what is done in the case of the French Society; and it would look still more so if placed alongside the German financing for similar objects.

But that in passing. The work of the Society is being more and more systematized; and, by means of Committees, observation is being kept upon the trend, in particular directions, of both the technical and commercial affairs of the industry—not only in France, but in Germany and Great Britain. The reports of the Committees should be of value, alike in the matter of the information afforded, and in the stimulating influence that they must inevitably have. Among the recommendations that were made at the recent meeting was one by a Committee on Coal, who advised that an analysis of the coal should in future be embodied in purchase agreements to serve as a basis of contract between gas companies and colliery owners. The idea is a good one, providing a fresh analysis is obtained with every new contract, and that tests are made at fairly frequent intervals during delivery under practically the same conditions as resulted in the analysis in the contract. We have known, and most managers have known, analyses of coal to vary considerably from the one originally made before a contract was entered into. And the need for analysis becomes of greater importance in these days when the quality of coal is showing a diminished value from pits that were at one time noted for yielding first-class gas-making coals. A cognate matter, referring to fuel, is this: The French believe in competitions and prizes; and there will be much interest next year in ascertaining the results of the competitions among makers of appliances for the utilization of gas coke. Our friends in France are keeping an eye upon the sources of competition in the residuals market; and it is clear that they find it necessary to see what can be done in the way of developing the domestic market for coke. In this matter, gas managers in this country will be as glad to learn of what is done in France, as the French gas managers no doubt are to observe what is being done in this country in connection with the development of the sale and use of coke by retailing it in small quantities in paper bags from door to door, as well as in the utilizing of it for the boilers of hot-water circulating systems.

Among the Committees of the Society who are watching the work that is being done in other countries, is one on carbonization; and they allude in their report to the system of heavy charges. Evidently little has been done in this direction in France; but we are not altogether with the Committee in entirely laying the blame for this at the door of the antiquated system of indicating the quality of gas by its illuminating power. If the character of the coal used is suitable for heavy-charge work, there is really little depreciation in the illuminating power of the gas made; and the other advantages (always assuming the suitability of the coal for the purpose) offer a considerable amount of compensation, which finds material financial expression in the accounts of gas undertakings—at any rate, it is so in this country. However, everything points to the days of the *régime* of the illuminating power standard coming to an end. When men of the technical activity, position, and influence of the President, of M. Cornuault, of M. Mallet, of M. Grebel, and of many others, use their opportunities to advocate calorific value as a standard, the movement will spread. Truly, if the Photometrical Commission continue to move at the pace they are doing at present in trying to bring about some international co-ordination of photometric methods, they will probably attain success somewhere near the time the gas industries of the various countries have received from the powers that be sanction to the setting-up of the only reasonable standard to-day—as has been done in Paris. The subject of calorific value was incidentally introduced at the meeting in connection with M. Cornuault's remarks on the extending work in Germany in the distribution of coke-oven gas for town use. He mentioned that he found the calorific power of the latter was 578 B.Th.U., which called from M. Mallet the remark that 467 B.Th.U. was a preferable figure for town supply. We agree with him. But, under our British conditions, the figure he mentions would be too high for adoption as a net value, as was shown in an editorial article in the "Journal" for April 25 last (p. 214), when dealing with the Paris calorific standard and certain points raised by M. Grebel.

By the way, with the paper by the gentleman just named on upright and inverted low-pressure burners (*ante*, p. 592) we are not altogether in agreement. There seems to be in it a little undercurrent of prejudice against the inverted gas-burner. Certainly, the extensive experience in this country with such burners working under the pressures in vogue here, and with a fair constancy in the composition and the specific gravity of the gas, does not confirm the bad character M. Grebel gives to the inverted burner in the first part of his paper. When he considers the large contracts in London for street lighting—a contract in the case of Westminster based on an illuminating power test, using both high and low pressure inverted burners—he will find that there are material grounds for carrying his investigation still further, and for the submission on our part that he has not produced an unanswerable case—under British conditions—against the inverted burner. Here many towns have pressures as low as 2 inches (though the general tendency is higher), and these inverted burners work without trouble. At the old pressures that were the vogue at one time, the experience was not favourable. But the inverted burner (this is experience, and not manufacturers' assertion) is of such value in this country—on account of its illuminating characteristics, and its economy in gas and mantles—in the competition with the metallic filament electric lamp, that the gas manufacturer has shaped, and is shaping, his supply conditions to enhance the serviceability of the burner; and that is the very proper attitude to take. M. Grebel's contentions, figures, and curves stand in strange contrast with those contained in the lecture by Dr. H. Bunte, also published last week; and we recommend them to the serious notice of M. Grebel. However, this is merely a reference to one of the papers presented to the members of the Société Technique. The translations of others published last and this week (particularly that of M. Laurain on "Tar Condensation at the Paris Gas-Works") show that there was not by any means dearth of technical interest and information at the meeting at Marseilles.

The Salford Publicity Conference.

The spirit of co-operation grows in the gas industry; and we welcome every sign of this. It was seen at the Gas Publicity Conference in London held in April last; it was seen again last Monday at the conference at Salford of the chairmen and the chief officials of gas undertakings in Lancashire and other counties in the North and Midlands. The energetic Mayor of Salford (Alderman F. S. Phillips), who is also Chairman of the Gas Committee, must be highly complimented on the result of the movement he made, in consultation with administrators and officials of other gas concerns, to bring about a conference to discuss the questions of support, and the measure of support, that should be recommended for adoption, in connection with the gas publicity scheme, to the respective Committees and Boards of the delegates. The conference in numbers, enthusiasm, and agreement with the proposals of the Publicity Committee was a conspicuous success; and it is believed it will have a widespread influence in advancing the movement in those places where there has been hesitation—this especially among the gas departments of local authorities.

The Publicity Committee was directly represented by Mr. F. W. Goodenough, Mr. Edward Allen, Mr. T. H. Duxbury, and Mr. Robert Watson; and these gentlemen were able to lead the discussion into proper channels. Mr. Watson did particularly good service in being able to announce that the Doncaster Gas Committee had persuaded the Corporation to contribute on the Publicity Committee's suggested basis of 2s. 6d. per million cubic feet of gas sold. The question of

the amount of contribution has, we believe, been more of an obstacle to the placing of the scheme on the substantial footing on which it is desired to set it at the outset than any question as to the propriety of the movement. But when the 2s. 6d. is levelled-down to its representation per 1000 cubic feet, it is microscopical; when it is set against the mountain of interests that it is going to assist in serving, it is hardly distinguishable. There is extended recognition of this on the closer inspection that is being made, and the spread of knowledge regarding the objects of the scheme. Those, too, who have thought the work should be taken up by merely crawling along at first, and improving the pace with time, are learning that this is diametrically opposed to the correct principles of advertising and of commanding attention. The Committee are right in their view as to advertising and other work. Managers of the big retail emporiums are right in their advertising methods. The greatest and most persistent of advertisers show the greatest successes.

It must not be imagined that the Publicity movement has been slumbering since the London conference. Although there has been a halt for a brief space in the march of subscribing undertakings, there has been a good deal of informal conference in different parts of the country, and communications seeking and conveying further information have been passing freely to and from Westminster. It is hoped now that points of doubt have been largely cleared up—now that so many representatives of municipal and company undertakings have been persuaded that the 2s. 6d. per million cubic feet sold is really a modest basis of contribution—the second stage of amassing funds for the publicity project will set in with vigour. There are no geographical bounds to the movement nor to the work. A common interest is the foundation of the scheme. This being so, we are pleased to see the broader view that is being taken, and the spread of the spirit of a community of interest in the gas industry.

The Æsthetic and the Gasholder.

THE advancing needs of a highly stimulated civilization have introduced many things which obtrude themselves on our vision in a bold dogmatic kind of way, and which we put up with for the sake of economy, convenience, comfort, and so forth. And the majority of us cannot, in this matter-of-fact and work-exacting world of ours, afford to eschew economy, convenience, and comfort for that somewhat intangible something known as æstheticism. In this country, there are tramways in our streets and gasholders here and there; and America has, in addition, its overhead railways and its skyscrapers. But they have all their uses; and they claim that the public are all the better for the economy and convenience thus provided. But ever and again, we have someone rising up, and having a tilt at the gasholder as a hideous, presumptuous, landscape-destroying structure. Mr. Frank Richards is the latest assailant of the gasholder; and he has given vent to his feelings in our American contemporary "Engineering Record." He does not look at the practical side, and ask himself seriously whether the gasholder has any good reasons for its existence; but he rushes at it solely as an annihilator of all that is æsthetic in the particular locality in which it stands. We are afraid that a sensible public would be slow, on the ground Mr. Richards puts forward, to destroy this protection of the continuity of the gaseous means of obtaining light, heat, and power, and this balancer between production and demand which contributes largely to economy in gas manufacture and supply.

Mr. Richards himself shows that he feels he is a sort of isolated agitator, and that there is no public demand for the abolition of the holder, when he says: "We have been so "familiar for so many years with the sight of the supreme "uglifier in every large outlook in every city in the land, "that we do not think to protest against it, or, in fact, in any "way to question its presence." Upon which it is right to ask Mr. Richards, why he should be desirous of raising trouble, and try to produce uneconomical conditions where economical ones now exist. We think that the prosperity of the gas business proves the fitness—anyway in this country—of the distribution plant (with auxiliary higher pressure) that has helped to create the prosperity. As an example, take the large business that has been created here in cooking by gas. The peak of demand is, very commonly now, during the two hours on Sunday when dinner preparations are being almost universally made in British homes. We do not know what would be done without the gasholder during this period; we do not know how so many gas-works in this country would, without their gasholders, succeed in closing-down gas-making on Sundays so as to give their men the advantage of the day of rest. The æsthetic would, without any compunction, massacre all practicability, economy, and convenience, and the workers' day of rest, in the furtherance of the shallow object of his worship. The necessity of the holder has been well proved by a vast body of gas-engineering talent, which, with all deference to Mr. Frank Richards, we do not expect is at all inferior to his own. It is for him to show that, by taking away the gasholder, he is not removing an important security to the public for obtaining light, heat, and power economically and conveniently. He would by his proposals reduce the gas industry to the same condition as the electric supply industry, and subject the consumer to the same disadvantage of drawing his supply direct from the place of generation without any sufficient means of intervening storage. Numerous electricity consumers in this country have had occasion to say: "Thank goodness, for the gasholder," when they have found their premises plunged into darkness, and have been wise enough to retain their gas-fittings.

But Mr. Richards is not so absolutely absorbed by the æsthetic that he overlooks the point of storage altogether. His idea is that high-pressure distribution (he says nothing about the loss in candle power and calorific power at the pressures he suggests) should convert the gas-mains into storage. It would not be (to say nothing of the colossal expense involved in making the canalization adequate) sufficient to produce economical work at the manufacturing end, nor in distribution. Few existing distribution systems up to the services would stand the pressures Mr. Richards proposes. At the same time, the editorial comments that are made upon his article in "Engineering Record" (as reproduced with extracts from the article in our columns to-day) seem to show that the writer has not any particular knowledge of what is being done just now in high-pressure distribution in town systems in this country, and yet the gasholder cannot be dispensed with. If he made a little investigation, he would find things are not so bad here as he would lead us to suppose they are in America, nor would he find any great deterioration of property values in the neighbourhood of gasholders. As a matter of fact, many instances could be pointed out to him where the erection of house property in the vicinity of gasholders has succeeded, and not preceded, the construction of the latter. If it were not for the expense and loss in illuminating and calorific values, a more practicable system than that suggested by Mr. Richards—in fact, it would be an ideal system—would be to compress the gas into large storage cylinders at the gas-works. However, the gasholder is not such a serious blot upon the landscape as the great factory chimneys with their air-polluting eructations, nor are they to the same extent as many other conveniences of modern progress, without which we should to-day, both individually and collectively, feel very much lost. Practicability is certainly not a noticeably strong feature of Mr. Richards's present attack, nor of his suggested means of effecting a change.

Is the Theory Correct?

THE phenomenal explosion of a Walker washer-scrubber at the Stalybridge Gas-Works a short time since, whereby a gas worker lost his life, bids fair to defy any explanation that will meet with common acceptation. Although the washer had for some years been only in intermittent use—the intervals of disuse appearing to have been somewhat extended—the methods adopted by Mr. W. Hill, the Engineer and Manager, for dealing with an unyielding obstruction in the machine were precisely those that would have been adopted by any engineer. After he had found that the ordinary process of steaming was unsuccessful, he did the most natural thing in the world, in having the cover removed for an examination. On the removal of the cover, an accumulation of tar and naphthalene was found, while the inside plates were heavily coated with rust. But soon after opening the cover, a whitish vapour began to rise; and in the hope that whatever was happening would be smothered, the cover was replaced. While this was in progress, an explosion occurred, with a fatal result for one of the workers.

These are the facts in a nutshell. What was the cause of the explosion? Those who have made investigation of the matter will not admit the generation of a spark in re-

placing the cover. It is all very much a mystery; and the only theory that can be put forward that it is thought has any feasibility about it at all, is that advanced by Professor Harold B. Dixon and Mr. S. Meunier, who were called in to make an investigation. But both of them are rather doubtful as to how the theory will be regarded by the gas profession; and therefore they entertain the belief that it will be subject to some criticism. The conclusion arrived at is that the heavy accumulation of rust on the iron plates must have been acted upon by the foul gas, forming a layer of iron sulphide sufficiently sensitive to oxidation to heat-up when air was admitted. There would in this case be much the same chemical action as sometimes occurs on oxide being removed from a purifier and exposed to the air, resulting in the sulphur content of the material being fired. No doubt the steaming assisted the iron sulphide to get into a more active condition. The heat so produced probably volatilized some of the constituents of the tar; resulting in the formation of an explosive mixture before the fire could be smothered.

This is the theory; and we do not know whether anyone will be prepared to contest it. It has not been formed at random, but is the considered opinion of two investigators on the spot. The only possible way of finally disposing of the matter would be to reproduce the conditions that are suspected of having caused the lamentable occurrence. But this appears impossible. We have heard of a case of a stoppage in a tower scrubber, which seems to have a little bearing. The scrubber had to be opened. When the foreman who had charge of the operations had the cover off, he noticed a deep brown oxide-coloured substance inside, and thought he would take a sample to the works' chemist. He put a small portion in paper; but, on passing through the yard, the paper inflamed, and slightly burnt the man's hand. There the matter remained. But the incident has a significance in connection with this Stalybridge accident. However, the Stalybridge experience points to conditions over which care must be exercised in future, as the possibility of accident (previously unsuspected) has been demonstrated in the emphatic manner that all deplore.

Lightning and Electric Lighting.

Many curious accidents have been reported from time to time in which lightning and private electrical installations have unitedly taken part. There was a case not long since in which lightning played sad havoc—wrecking many among the electric lamps in the private houses of a certain district. During the heavy and disastrous storm of last Wednesday evening, which appears to have assailed London and its environs with peculiar ferocity, a serious fire occurred at Trinity Church, Marylebone, while a dedication service was in progress. A morning paper says that shortly after the commencement of the service, a vivid flash of lightning was followed by a report caused by a fuse-box being blown out; and it was soon afterwards found that a portion of the south gallery was on fire. The congregation were asked to leave; and we take it they were not slow in complying with the request. Before the flames could be checked by the Fire Brigade, a large part of the structure, it is said, had been damaged. Electric wires were destroyed; and the main fuse-box in the crypt was damaged. The rest of the building and contents suffered from the effects of heat, smoke, water, and breakage. It was fortunate that more extensive mischief was not done. Another morning paper, reporting the fire that occurred on the upper floor of the Royal Exchange, states that it was due to the lightning causing an electric wire to fuse. Heavy lightning and quite ordinary electrical installations are not always the best of companions.

Why not all Statutory Bodies?

In the paragraph in last week's issue under the heading of "Labour in Politics," reference was made to the Bill introduced by the Government to palliate the Trade Union grievances over the Osborne judgment, which judgment deprives Trade Unions of the right of political activity, and the compulsory levying of funds for the purpose. The Government propose, on a majority vote, to make political activity an object of Trade Unions, but to protect minorities who are not in agreement, by defending their rights as trade unionists, though they decline to contribute to the political funds. That is right. But, as pointed out last week, it is not what the Labour Party want. When the measure was up for second reading last Tuesday, there was an interesting discussion upon it, in which it was made clear by the Labour Party that it was not at all what they desired—nothing short of a complete reversal of the Osborne judgment was what they asked for, and what was expected. One of the most interesting of the speeches on the occasion was by Sir Alfred Cripps, who sees in the measure a principle which more than any other would tend to the degradation of political life in this country. He lays down the proposition that Trade Unions should not be regarded as privileged bodies. With this, few other than the Trade Unions and their supporters will disagree. If such unions have rights in regard to political action and subscriptions accorded to them, then similar rights ought to be granted to every other statutory body, including joint-stock companies. Sir Alfred considers, however, the correct principle is to deny Trade Unions the right altogether to political purposes and funds. It does seem an inconsistent proposition to give to labour what is denied to joint-stock enterprises, and to professional and other organizations that are subject to general or special legislation. The Bill will next be considered in Committee of the Whole House.

Proportional Municipal Representation.

A measure has been introduced into Parliament which bears the same title as one brought forward last year and then dropped—that is, the Municipal Representation Bill, the object of which is to authorize the introduction of proportional representation in municipal elections, and other purposes connected therewith. It is presented by Mr. Robertson, and supported by eight members, among whom are Mr. Burt, Lord Hugh Cecil, Sir Alfred Cripps, and Sir Henry Kimber. There are only nine clauses to the Bill, which, however, embraces also two schedules giving (1) rules for the transfer of votes and for ascertaining the result of the poll, and (2) the form of ballot paper to be used. It is pointed out in the course of the memorandum to the Bill that at present each ward of a municipal borough, or the whole borough, if not divided into wards, elects several councillors. In London, as a result of orders made by the Local Government Board under the London Government Act, the elections are triennial, and affect the whole of the Council; but in Provincial boroughs one-third of the Council is elected every year. In all cases, a voter can give as many votes as there are vacancies; but not more than one vote to any one candidate. Thus a bare majority of the electors can secure all the vacant seats. This is the condition of affairs which it is the object of the Bill to alter. It is proposed to allow municipal bodies, by a resolution of a three-fifths majority, to change this system so as to allow each voter to give one vote only, and thus enable any considerable fraction of the electorate to return one member. In Provincial boroughs adopting the Act, it is remarked, the Metropolitan system of triennial elections would be substituted for the present plan. The alteration would, in the first instance, take effect for three years only, but could be continued in force by two successive resolutions at intervals of three years. The last resolution would be laid on the table of both Houses of Parliament, and could be annulled by an address of either House. It is explained that, on the system of voting proposed, the number of votes necessary to secure the return of one member is approximately the result of a division of all the votes cast by the number of vacancies, and is called the "quota." In order to prevent waste of votes, provision is made for the transfer of votes in excess of the quota given to any one candidate, and of votes given to candidates whose supporters are less in number than the quota. Such votes are transferred to the candidates whom the voters indicate on their ballot papers as next in order of their preference.

Funeral of the late Alderman Brown, of Dewsbury.—As intimated would be the case in the last number of the "JOURNAL," the funeral of Alderman Joseph Brown, of Dewsbury, which took place on Monday, the 29th ult., was of a semi-public character. The chief mourner was Mrs. Brown, the widow, for whom much sympathy is felt; and she was supported by her only son (Mr. J. H. Brown, of Nottingham) together with her daughters and their husbands. A body of police headed the procession to Dewsbury Cemetery; the Mayor and Corporation following, attended by representatives of the Poor Law Unions' Association of England and Wales, of which Mr. Brown was the President, the Dewsbury Board of Guardians, the District Infirmary, the Wesleyan Local Preachers' Mutual Aid Fund, and the United Liberal Association for the Parliamentary Borough of Dewsbury.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 689.)

THE general aspect of things on the Stock Exchange last week showed improvement. It was a relief to get through the long nineteen-day account; and, as money was plentiful and formidable obstacles did not present themselves, the settlement was approached with confidence. Business was, of course, reduced by the Epsom Races, and by the advent of the Whitsuntide holidays. Some markets showed out firmer. Consols, though not closing at their best, scored an advance in the week of $\frac{1}{8}$ for money and $\frac{1}{4}$ for account. The opening day was encouraging. Government issues were firm, though inactive; and Consols were rather better. Home Rails were cheerful, and prices rose. Americans had more backbone in them; and Foreign were calm and steady. The next day was a good sequel; the firm points being well maintained. Consols rose $\frac{3}{16}$, Rails were on the whole, though not uniformly, higher; and the other departments named stood firm. The Derby Day was as quiet as it could possibly be on a final day of the settlement; and the tendency was variable. Gilt-edged were pretty good; but Rails were irregular. Americans were very flat—somewhat annoyed by Mexican alarms; but the Foreign Market was steady. On Thursday and Friday, the markets were quite dominated by the holiday feeling, and the tone was variable. Consols were rather lower; and Rails had a poor time, with prices lower nearly all round. But Americans jumped up as sharply as they had fallen. The Exchange was closed on Saturday. In the Money Market, there was a good demand, more especially for the settlement and the month's end; but the supply was ample. Discount rates hardly moved. Business in the Gas Market was only moderate in volume. But the tendency was quite firm; and several issues had a slight advance in price. In Gaslight and Coke, the ordinary was steady and unchanged at from 105$\frac{1}{2}$ to 106. The maximum marked 87, the preference 103$\frac{3}{8}$ and 104, and the debenture 81$\frac{1}{8}$—a rise of $\frac{1}{2}$. South Metropolitan was quiet and unaltered—changing hands at from 119 to 120. The debenture rose $\frac{1}{4}$. Nothing was done in Commercials; and it may be noted that the debenture stock stands at 77-79, while the like issues of the other two Metropolitan Companies are at 80-82. Among the Suburban and Provincial group, Alliance and Dublin realized 84$\frac{3}{4}$ and 85, ditto debenture 95$\frac{1}{2}$, Bournemouth "B" 16$\frac{1}{2}$ and 16$\frac{9}{16}$ (a rise of $\frac{1}{4}$), British 44$\frac{5}{16}$ and 44$\frac{3}{8}$, and South Suburban 120$\frac{3}{4}$. In the Continental Companies, Imperial was unchanged at from 186 to 187; Union marked 95 *cum div.*; and European 19$\frac{3}{8}$ and 19$\frac{1}{2}$. Among the undertakings of the remoter world, Bombay was dealt in at 6$\frac{15}{32}$, Cape Town debenture at 88, Primitiva at from 7$\frac{3}{4}$ to 7$\frac{29}{38}$ *cum div.*, and from 7$\frac{9}{16}$ to 7$\frac{11}{16}$ *ex div.*, and San Paulo at 19 and 21.

ELECTRICITY SUPPLY MEMORANDA.

The Electrical Profession no Longer Attracts—The Trend of Business in the Industry—Lighting Business at Leeds becoming a Comparatively Unimportant Factor—The Art of Electrical Canvassing—Result of an Earth Leakage—Queer News—Unsuccessful.

THE Engineering Correspondent of the "Daily Telegraph" has been writing on the subject of "Electrical Engineers." It is a subject of many phases, and one upon which one could expatiate to almost any length. The electrical engineer—the station variety—is alternately praised and kicked in certain quarters. Sometimes he does things right, and sometimes he does the contrary. But for the worry and anxiety that the station engineer has to put up with, he is as a rule certainly underpaid. So it comes to pass that the Engineering Correspondent of our influential daily contemporary is able to write that it is a fact that, for the average young electrical engineer, the prospects in the industry are not so enticing as they should be. "Moreover, there is another reason, and a purely commercial reason, why young fellows are not specializing in such numbers as a few years ago for this class of work. Things are not well with the electrical industry in this country." There is a mournful touch about these words. But though things are not well, it is found—a little later on in the same article—that the Engineering Correspondent sees "signs that better times are in store for the electrical industry." The signs of the electrical industry have a way of perennially maintaining the same state. Once an electrical sign always an electrical sign. There have been signs of better times, according to the organs of the electrical industry, from its infancy up; but interspersing an effulgent hopefulness, there have been lamentations and talk of the persistence of heavy clouds. Hence the Engineering Correspondent, in the goodness of his heart, speaks of signs of better times, while in the same breath he talks of things not being well with the electrical industry in this country.

What are the signs? Excepting for tramway traction, for special purposes for machine driving, and for convenience (not for anything else) in decorative illumination, electricity has had a hard time in the competition. At every turn, the progress in the applications of gas for lighting has opposed it; and it has never yet been able to touch gas as a heating agent for all domestic purposes—cooking, water heating, or house warming. The puny efforts of our electrical friends in these directions are ludicrous in comparison. Electricians boast loudly. But what of the actual commercial results in relation to the success of gas among householders? In reading the reports on the trading of the municipal and company electricity undertakings, we learn of the private consumption increasing at such-and-such a rate. But invariably it is found that the statement follows that the greater part of the increase is for power supply. We may take Leeds as an example of this—perhaps we should say as a distinguished example. The electricity sold last year amounted to 14,372,765 units, which is an increase of nearly 2 millions upon the preceding year. Of the total, only 4,460,328 units were supplied for private lighting, against 4,575,957 units the year before, 926,351 units (compared with 937,193 units) were used for street lighting, and 8,986,086 units for power and heat. It will therefore be observed that, from one cause or another—the metallic filament lamp and (it may be assumed) the cheapness of illumination by inverted gas-lamps—the consumption for private lighting continued to recede during the past year, while the whole of the increase was for power and heat. We should, for interest's sake, like the consumptions for power and heat to be separated. The average price obtained per unit was 1·74d. against 1·91d. This condition of things is not healthy, in view of the continued increase of the power units, and the big drop there has been in the lighting units. Take Birmingham as a further illustration. There was last year an increase of 30 per cent. in the units sold for private supply, but it was principally for power purposes.

Reverting to Leeds, the sales for private lighting were 2·5 per cent. less last year than the year before; and this 2·5 per cent. was upon a 12·7 per cent. loss in the latter. But the output for power and heating increased by 30 per cent. The "Electrician," referring to this, remarks that "the gas journals can scarcely say, in the case of the Leeds electricity undertaking, that the cheap power supply is provided at the expense of the lighting consumers; indeed, as the output for power and heating is now more than twice that of private lighting, and is increasing at a rapid rate, the lighting output will soon become a comparatively unimportant factor." Is that so! Very well, perhaps, as a point of interest, the writer of those words in the "Electrician" will obtain the exact average price per unit paid for power, will then multiply the private lighting consumption by the average price per unit, and with the answer before him will reconstruct the department's accounts. He will then see—by contrasting the result with the financial obligations of the department—what answer the "gas journals" are likely to give to the first part of the quoted remarks, as well as the view of the "gas journals" as to whether the lighting output will soon become "a comparatively unimportant factor." We have an idea the responsible engineer and manager of the Leeds Corporation Electricity Department will not subscribe to the statement. Now that it cannot be said that the power consumers deserve special treatment because they are making use in the daytime of the plant required for lighting in the evening (apparently power requires more plant now than lighting), the power consumers ought surely to bear their proper proportion of the capital expenses, instead of the lighting consumers bearing their improper proportion. If the old arguments prevailed to-day, the lighting consumers would be looked upon as providing an evening load for part of the plant required for power purposes in the daytime; and power prices would go up, and lighting prices would come down considerably, in order to secure additional lighting custom to keep the generating plant required for power purposes going to a fuller extent during the evening hours. It is rather an interesting suggestion that our contemporary makes as to the lighting business. But we will leave the matter for the time that will be needed by our friends in ascertaining more about the growing unimportance of the lighting unit as a factor in the position at Leeds.

We read or hear about the "art" of this, or the "art" of that. The "Electrical Review" recently had an editorial on "The Art of Canvassing." Here are one or two excerpts: "There is not much difficulty in convincing people that electric light is the best form of illumination." The "Review" apparently thinks lightly of the intelligence of the people. "The quantity of light obtained respectively from gas and electricity for the same outlay can be shown by photometrical measurement, and suppliers may refer with confidence to the results of tests, which will prove how much more electric light is obtained for the same money as for gas during the respective lives of the metallic filament electric lamp and the incandescent gas mantle." Really, we cannot quite understand what funny notions our contemporary has got into its head in penning this statement. The money part of it is altogether untrue, unless an inflated price is paid for gas and a low one for electricity; and, seeing that one can get a dozen inverted gas mantles for the same price as a 50-candle power metallic filament lamp, and that inverted gas mantles have a protracted life, we do not quite see the object of the words "during the respective lives of the metallic filament electric lamp and the incandescent gas mantle." We know the strange ideas that our electrical contemporaries have as to what may be regarded as things that are fairly on an equality for the purposes of comparison. But this is quite a new and an extraordinary one. Only a night or two since, three inverted lights were seen in the dining-room of an ordinary gas consumer (in all other respects than as a consumer, he is totally unconnected with gas affairs); and he stated that only one of the mantles had failed since the burners were put up over twelve months ago. At this rate, one of these burners would not in ten or twelve years

require more spent upon it for mantles than a single metallic filament lamp of the same candle power wouldcost.

Another excerpt from "The Art of Canvassing." "The candle power should be tested frequently, as the gas mantle falls off rapidly (in more senses than one), whereas the electric lamp retains its efficiency for some 2000 hours [unblackened ?]." Phew! Does the "Electrical Review" apply this statement as to a rapid falling off to all makes of mantles—Welsbach, Voelker, Veritas, Bray, and a number of others too great to mention—and of the upright and inverted forms. We should like to know whether the omniscient "Review" ropes them all in together, or has in view some particular mantle or mantles. The makers would no doubt also have a little interest in ascertaining precisely what the "Review" means. However, we shall look with curiosity for the reply of our contemporary. It is rather suspected that it will only prove to be one of the stock electrical commonplaces; and that the paper will not have the courage to tie itself to any categorical reply. Our contemporary suggests that a gas mantle (we hope that an inverted gas-burner is referred to) and a metallic filament lamp should be kept running and tested by electricity supply undertakings, and the results recorded in the local publications. We devoutly wish every electricity undertaking would comply with this suggestion. But the managers of most electrical undertakings are in this matter more wary than the "Review." We remember the Canterbury tests. The same paper rakes up the results of electrical tests of street gas-lamps and metallic filament lamps at Sheerness. Poor hard-pushed "Review." Why did it not refer to the latest Westminster tests? We like to play the game. There is one more excerpt: "For street lighting the electric metallic filament lamp is so much superior to gas, through its not being affected by wind and rough weather, that in competition with the gas mantle on legitimate lines it has nothing to fear." A penny 'bus fare will take a member of the staff of the "Review" to Westminster; and about the same sum, or a trifle more, to several other boroughs where inverted gas-burners have been adopted in the street-lamps. A trip to the Crystal Palace might also be edifying. However, the article from which we have just been quoting was on "The Art of Canvassing." There was clearly an omission in the title. The word "Electrical" should have appeared before "Canvassing."

Mr. W. R. Rawlings, of South Kensington, S.W., writes to the "Electrical Times" regarding a curious result of an earth electrical leakage; and it is almost unnecessary to say that it [the result] was one of the most remarkable he has ever met with. He says: "A $\frac{1}{8}$-inch iron gas-pipe crossed in close contact with a $\frac{3}{4}$-inch lead water-main, the walls of which were 3-16ths inch thick. The current fused a hole in the lead pipe and also in the gas-pipe simultaneously; and it was not discovered until someone turned on a gas-jet, and found he had water instead of gas. The fusion of the pipes was so perfect that it connected the water-main to the gas, bringing about the result described. I may add that the pipes did not unite completely; and there was a leakage of water at the juncture, which no doubt put out the arc." He further mentions that he will be pleased to exhibit the two pieces of pipe to anyone interested.

Items of "news" are occasionally published by our electrical contemporaries that altogether pass our understanding. Illustrations were recently supplied by the "Electrical Review." Here is one. The Ashton-under-Lyne "Board of Guardians have decided to have the whole of the workhouse premises illuminated by electricity in place of gas. It was stated at the Committee meeting that the cost would be no more than if the present gas installation were thoroughly renewed and made effective." If the place had to be piped new throughout, it could not cost so much as putting in a complete electric installation if the work is properly done with an eye to safety. But we imagine the workhouse is already fully piped; and therefore the cost of putting in inverted or other efficient incandescent gas-lamps would be far less expensive than putting in metallic filament lamps, though for economy's sake these were of lower illuminating power than the incandescent gas-lamps. Here is another tit-bit of curious intelligence. "At a meeting of the ratepayers of Selby called to discuss the lighting of the town, Mr. Edgar Cox-Walker, of Messrs. Cox-Walkers, electrical engineers, of Darlington, explained the advantages of electric lighting; and tenders were received for both electricity and gas—the former for 50-candle power lamps at £37 per annum, being submitted by Mr. Sykes, of Middleham; while for gas the quotation was £40 per annum, with from 12 to 14 candle power lamps. The voting resulted in electricity being adopted by 39 votes to 22." Why 12 to 14 candle power gas lamps? These must be flat-flame burners, which would consume as much gas as would a 100-candle power inverted burner. There is something wrong about the information supplied to the Ashton-under-Lyne Guardians and to the Selby ratepayers.

Readers no doubt saw in the "Journal" recently an unpretentious news paragraph recording the comments of a certain Judge in one of the Metropolitan County Courts regarding the number of bankruptcy cases of electrical contractors that came before him. This is a condition of things that not only applies to London, but to the suburbs and provinces. On one page of a single issue of an electrical paper lately, there were three instances of electrical engineers who have not found the business a highly profitable one. The extraordinary business, too, that it is announced in electrical quarters abounds in connection with metallic filament lamps is not spreading support to all who seek fortunes in this direction. One person trading as the Yorkshire Metal Filament Lamp Company has had to face his creditors; and the British Tungsten Lamp Company, Limited, have been forced into liquidation. The total unsecured liabilities in this case appear to be £14,759; and the assets available in respect of this sum *nil*. The receiver for the debenture holders will be pleased to have tenders for the land, factory, plant, &c. It is said that the introduction of a moderate amount of capital would render the business a very remunerative one. Then why do not the shareholders find the capital? Echo answers, why! They have already lost, and will not repeat the experiment.

NOTES FROM WESTMINSTER.

Two or three points of interest cropped up in the Committee Rooms last week. The Margam Council got their Bill through Committee; and so have the Cudworth Council theirs. The Liverpool Provisional Order, applying the "Metropolitan" No. 2 burner to the testing of the gas of Fazakerly, was before a Committee, who ordered the Confirmation Bill to be reported to the House for third reading.

Margam's Ambition. The Bill which the Margam District Council promoted for the purpose of empowering the purchase of the part of the gas undertaking of the Aberavon Corporation in their district has had its preamble declared proved by Mr. Mooney's Committee in the House of Commons. Margam, it appears, is now a larger place than Aberavon, though it was not so when Aberavon first began to supply it with gas. The people of Margam are strongly opposed to being tied to Aberavon, and resent having to contribute, through the profits made from the supply of gas, to the liquidation of the debt on the undertaking belonging to a neighbouring authority and to contributing to the profits that are placed in their hands. They also introduced a list of grievances as to the indifferent gas supply by Aberavon that covered the whole gamut of known gas complaints. But if there are any justifiable complaints, they should not be beyond remedy. There is another side to the question. Aberavon has developed its gas-works, in the belief that the integrity of the area of supply would be maintained; but, in opposition to this, it is contended that if the gas business was properly developed in Aberavon, the works would not be too large for the town's own purposes. There is nothing that Margam advanced as to the supply which, if true, is beyond the power of correction. And we are not convinced that the severance of the gas undertaking will be to the advantage of either Margam or Aberavon. It will be a surprise if there is not a strenuous effort made in another place to reverse the decision of the Commons Committee.

A Cudworth Agreement. Days and hours, and even briefer time, may see a measure in Parliament pass from an opposed to an unopposed state. Only a week ago, we were anticipating that, when the Cudworth Gas Order Confirmation Bill was introduced for consideration by a Committee of the Commons—the Hull and Barnsley Railway Company having secured *locus standi* against it—there would be at any rate a little fight. But, in the event, there was no real hostility shown. The Barnsley Gas Company and the Midland Railway Company appeared; and they were there to see that a saving clause giving them protection was inserted in the measure. As was pointed out last week, the Cudworth District Council have hitherto been supplied with gas in bulk by the Barnsley Gas Company; but they desire to cut themselves adrift, and to put up manufacturing works of their own. The Barnsley Gas Company have been supplying direct the Cudworth Station of the Midland Railway Company; and the two Companies desire to maintain the present relations. One can quite see why; and therefore no explanation is necessary. The District Council never have had the supply of the station; and so it was not a difficult thing for them to renounce any claim to it. Their consent to the insertion of a clause protecting the supply by the Gas Company of the station and premises of the Railway Company within the district of the Council sent all the parties away from the Committee room perfectly happy and contented. So the Order proceeds.

Rhymney and Merthyr Tussle. Most things come to an end at some time; and the Duke of Northumberland's Committee must have been very glad to come to the end of the discussion of the Rhymney Bill, which proposed the establishment of a Water Board with large powers, and of the Merthyr Corporation Bill, which contemplated the construction of new water-works where the Water Board were also proposing to operate. The Water Board Bill was rejected by their Lordships; and the Merthyr Corporation Bill was allowed to proceed, with various amendments. Among them, protection was given to the Cardiff Corporation in respect of places they are now supplying with water. The Merthyr Corporation are to supply Caerphilly in bulk for distribution in what is known as the Nelson Ward, which otherwise would be left without sufficient water. The price is not to exceed 6d. per 1000 gallons. The Committee also gave the Rhymney and Aber Valleys Company power to take a maximum of 4 million gallons of water per day, instead of the 3 million gallons proposed, with the stipulation that they should not be liable to an abatement as other authorities are. With these and other minor alterations, the Merthyr Bill will go forward; leaving the Water Board scheme defunct.

THE LATE MR. W. J. JENKINS.

THE circumstances attending the tragically sudden death on Monday, the 29th ult., of Mr. William John Jenkins, of Retford, to which reference was made in the last number of the "JOURNAL," were inquired into by the District Coroner (Mr. E. S. Spencer) in the afternoon of the day on which the distressing event occurred. Miss Catherine Howell, the cousin and housekeeper of the deceased, gave evidence as to finding him in an unconscious condition by his bedside. She summoned medical aid; but he never regained consciousness. He was 52 years of age. He had had attacks of nasal hœmorrhage about fifteen months previously; but otherwise he was in good health. Dr. Tristan said when he reached the house Mr. Jenkins was dead. He had attended him for the attacks referred to; and he thought they were really Nature's means of relieving the condition of the head. He had examined the body, and had ascertained that death was due to apoplexy. The Jury returned a verdict of "Death from natural causes;" and, through their foreman (Mr. W. Loseby), they expressed their great sorrow at the death of so useful a citizen, and their deep sympathy with the relatives; and the Coroner agreed with this. Mr. Jenkins was, he said, a man who could very badly be spared in Retford, and a gentleman for whom everyone had the greatest respect.

The late Mr. Jenkins was born at Llangantin, in Breconshire; his father being a miller and tenant farmer. At the age of seventeen he went to the Midland Railway Works at Derby. While there, he attended the evening classes at the Science and Art School, and afterwards became a teacher. He later filled for a time the position of Assistant County Analyst. In 1880, he was appointed chief draughtsman to Messrs. William Alchin and Co., traction-engine makers, of Northampton; and a few years later he joined West's Gas Improvement Company in a similar capacity, where he was afterwards raised to the position of Manager—an office which he held for eleven years. While with the Company, he saw power applied to the first retort-charging machine invented by Mr. John West. Upon the death in September, 1895, of Mr. Charles Hopkinson, of the Beehive Works, Retford, Mr. Jenkins went to that town, and commenced business as a gas engineer, with the title of Messrs. W. J. Jenkins and Co., Limited. Under his capable management, the works grew rapidly. He commenced with about forty men, and now the firm employs about ten times the number. The experience he had gained while with West's Gas Improvement Company stood him in good stead in carrying on his business as a manufacturer of retort-stoking machinery. Within four years, fifty-eight installations of this machinery, besides a large number of coal and coke handling plants, retort-houses, settings, &c., have been carried out by the firm.

Mr. Jenkins, who was an associate member of the Institution of Civil Engineers, and a member of the Manchester Association of Engineers, had associated with him an efficient staff—Mr. J. E. Lister, his principal Assistant, Mr. J. W. Durnford, Mr. Williams (Works Manager), Mr. P. Fisher (Cashier, and the oldest official, in length of service, at the Beehive Works), Mr. Dallas (Outdoor Manager), Mr. C. Ward (Chief Draughtsman), and others, all equally capable as heads of their respective departments. As evidence of the feeling of respect entertained for Mr. Jenkins by his workpeople, shortly after ten o'clock on the morning of his death all the men filed out sorrowfully and silently from their shops into the adjacent lane. The shock was too much for them; and many were in tears. A deputation waited on Mr. Williams and represented that it was impossible for them to settle down to work, and permission was given to shut down for the day. Some of the onlookers state that it was the most pathetic sight they had ever witnessed. Mr. Jenkins was always thoughtful for those in his service, and studied their comfort while at work and their general welfare. About three years after going to Retford, finding there was a lack of technical education among the youths who were engaged at his works, Mr. Jenkins employed a teacher to give lessons two evenings a week on the subjects of steam, applied mechanics, and machine construction. These classes were carried on until the increasing volume of trade rendered it necessary to discontinue them at the works, where they had been held hitherto.

Mr. Jenkins was a Justice of the Peace for Retford; and at the sitting of the Borough Police Court on Monday last week, noble tributes were paid to his works and worth. Mr. T. Bescoby, who presided, said they as Magistrates felt that the death of their colleague was a great loss to the town and district, and their sympathy went forth to the relatives who were left behind. Mr. J. A. H. Hirst, as Senior Magistrate of the Bench, associated himself with what had fallen from Mr. Bescoby. He said he had the pleasure of the friendship of Mr. Jenkins for many years; and he should always remember with what sound judgment he regarded all the cases that were from time to time brought before him. Mr. S. H. Clay, on behalf of the advocates of the Court, and Superintendent Thomas, representing the police, joined in these expressions of regret and sympathy.

The funeral took place on Thursday, at Ordsall Churchyard. The procession to the church was about a quarter-of-a-mile in length, and included the Directors, staff, and employees of the firm, engineering friends, and representatives of public bodies. Among the mourners were Mr. J. E. Lister, the Assistant Managing-Director of the Company, Mr. J. Ferguson Bell (Derby), as representing the Institution of Gas Engineers, and Mr. Robert Watson (Doncaster), the Manchester District Institution, Messrs. Fred. J. West (Manchester), J. A. Drake (Halifax), and T. S. Clapham (Keighley), representing the Society of British Gas Industries, Mr. F. C. Sugden (Leeds), and the following gas engineers: Messrs. J. B. Fenwick (Retford), Thomas Glover (Norwich), J. T. Jolliffe (Ipswich), and Henry Simmonds (Bury). There were a large number of floral tributes; and messages have been received from a number of gas engineers all over the country.

The "Retford Herald and Leader" last Tuesday contained a notice, within black borders, of the life-work of Mr. Jenkins, whose portrait was given; and the following editorial references were made to the event which had called forth this tribute of respect.

Yesterday was a sad day for Retford. With tragic suddenness, one of the most useful of her citizens was taken away in the person of Mr. W. J. Jenkins, J.P., head of the firm which bears his name, and whose reputation the last fifteen years of his life had been spent in building up. Mr. Jenkins possessed a charm of manner and an equability of temperament which made his acquaintance a great privilege to all who were fortunate enough to meet him. Mr. Jenkins was a great conversationalist, and his manner of treating everyone on the same footing always made these conversations agreeable in the extreme. His great knowledge gained in the school of experience and travel, as well as in the technical schools of applied mechanics, made his conversation most interesting; and withal he was not in the least pedantic. It is given to very few successful business men to combine in one personality so many excellent qualities. It used to be said that he could take his coat off in any of the shops at his engineering works with the best of them; in the drawing office he was equally at home; while on the road there was no one whose presence was more welcome in the dens where commercials "most do congregate" than Mr. Jenkins, and few of them were so successful in obtaining orders. To his workmen he was always kind and considerate; the deserving institutions in the town were helped as far as his modest means would allow; and with his personal friends he filled a large share in their thoughts, by reason of his true-hearted friendship and his sterling personal qualities. In the world of politics as in the world of commerce, he will be greatly missed.

AN APPRECIATION.

By the painfully sudden death, in the prime of life, on Monday morning last—the 29th ult.—of Mr. W. J. Jenkins, J.P., founder of the well-known engineering firm of Messrs. W. J. Jenkins and Co., Limited, of Retford, the gas industry has lost a capable and far-seeing pioneer, who, by sheer hard work, untiring energy, and self-reliance, raised himself to an influential position, and achieved a reputation as an engineer of recognized worth and ability. He enjoyed, in a marked degree, the confidence and esteem of many friends in business, and honour in the town of his adoption, where he rapidly developed a successful business, giving employment to some hundreds of employees, whose confidence he obtained by straightforward dealings, combined with a generous disposition and pleasant manner to all with whom he came into contact.

In business he was energetic, of quick perception, with a large store of practical knowledge upon a variety of subjects, gained by extensive observations and experience. So his advice was generally esteemed by those who entrusted contracts, both large and small, to his firm, as he could be relied upon to give impartial information upon the subject.

His quiet, unassuming manner hid from those less intimately acquainted with him a wealth of knowledge, discernment, and culture that made him a delightful companion. Being exceptionally well-read, a shrewd observer of men and things, combined with an extensive memory, he had a fund of interesting and instructive information which he narrated in a manner that gave pleasure and diversion to his more intimate friends.

Mr. Jenkins was a good linguist—speaking French and German fluently. His mathematical attainments were of no mean order; and he was generally acknowledged to be an engineer of unusual ability.

The numerous installations of De Brouwer retort-stoking machinery, with coal and coke handling plants, including the De Brouwer hot-coke conveyor, are monuments to his technical skill and sound engineering; and to his credit it may truly be said he was at all times ready to place freely at the disposal of clients and others information of a valuable and comprehensive nature, sometimes even to his own detriment.

It is a pleasure to hear those who were at times rivals from a business point of view, speak of his high character and amiability on all occasions.

His name will always be associated with an important development from the generally accepted practice in the method of carbonizing, by the substitution of heavy for light charges in horizontal retorts, the value of which is now very generally appreciated by those who work in retort-houses.

The success of the De Brouwer type of stoking machinery is largely due to Mr. Jenkins's ability and technical skill in the improvement and important modifications introduced to make this type of machine suited to the conditions prevailing at gas-works in the United Kingdom. This no doubt is in great measure the reason they are so much more widely adopted here than on the Continent, where they were first introduced.

The writer received on the morning of his death a letter in which he expressed his pleasure at the prospect of being present at the Institution meeting at Glasgow—on the invitation of the

President. Alas! this was not to be; and many will mourn the loss of a sincere friend, wise counsellor, and a man worth knowing, whose life is aptly summed up by the lines—

Whatever you are, be noble;
Whatever you do, do well;
Whenever you speak, speak kindly;
Wherever you dwell, give joy.

June 1, 1911. J. F. B.

GASHOLDERS IN INHABITED AREAS.

A Protest from America.

Our New York contemporary "Engineering Record" for the 6th inst. contains an article by Mr. Frank Richards, of that city, questioning the right of suppliers of gas to occupy parts of town areas with what he calls "protuberant" gasholders. He says he does not raise the question from the point of view of either the producer or the consumer of gas, but of the general and long-suffering public, to whom it cannot be a matter of indifference, seeing that it touches all at more than one sensitive point, and in an objectionable way which should not be tolerated or permitted, except in so far as it may be unavoidable. "We have been so familiar for so many years with the sight of the supreme uglifier in every large outlook in every city in the land," says the author, "that we do not realize the unsightliness of it; we do not think to protest against it, or, in fact, in any way to question its presence. Who has thought of asking by what right the holder intrudes, or has suggested its expulsion if its necessity and right are not proven and upheld?" Mr. Richards says the question is so far from ever having been formulated that the gasholder has never treated the public as in any way entitled to an explanation or a justification wherever and whenever it has chosen to plant itself. It has, no doubt, at times had to establish certain legal rights to locate, but always upon the unquestioningly conceded assumption of the imperative necessity of it. "Is it so necessary and indispensable?" he asks. If so, it should be "up to" the gas people to prove it in the light of the present century.

The author reminds his readers that people are beginning to take an interest in the appearance and condition of the cities in which they live, and that many movements are on foot for their betterment. But what is to be done with the gasholder? He gives some views of portions of New York which he says have been detrimentally affected by being in close proximity to gasholders. In one case, values have been so depreciated that it is only possible to erect "tenements of the cheapest class for the occupation of the minimum wage earners and of the stragglers for precarious subsistence." Mr. Richards sarcastically characterizes this depreciation in value as a work of "great beneficence;" for he asks: "If it were not for the blessed gasholders, where would these poor people go?" He says he could get pictures of similar character to those he presents from each of the dozen gasholder neighbourhoods of Manhattan, and the same of every other large city; showing them all to be "nuclei of desolation, and responsible for the depreciation of property values amounting in the aggregate to hundreds of millions of dollars." Supposing that some day there should come the assurance in advance that the gasholders in the cities would all have to go—and Mr. Richards thinks the gas companies are likely to be themselves the first to realize it—what an attractive and promising speculation it would be, he says, to "quietly buy up all the depreciated property in these gas-blighted neighbourhoods." The gasholder is, in his opinion, the survival of the unfit, if not the unfittest; and it seems more tenacious of life than any other thing of which there is record.

Mr. Richards considers that the whole question of the retention of gasholders in inhabited areas is one of pressure. He says if the gas business were starting to-day, it would not begin with the absurdly low-pressure service now in use—the pressure of a hundred years ago—in storage and in distribution. Even a slight increase would be "death to the gasholder at once." An increase of 1 lb. in the pressure within a large gasholder would require an addition of about 2000 tons to the weight on the top; and this would give a steel top over 3 inches thick—"an effective armour against aeroplane bombs." Dealing with the excuse put forward for having large gasholders that they are required to meet the "peak load," Mr. Richards admits this, if low-pressure transmission and distribution are retained; but with an increased pressure to only 15 lbs. on the square inch, he says "the volume of gas would be reduced one-half, and it could be driven along at more than four times the present speed, so that pipes of the same size as those now in use would transmit eight times the quantity of gas, or as much in three hours as can now be sent through in the 24 hours." This, he thinks, would be at a speed sufficient to take care of the peak load, and supply all consumers at all times without gasholders. He says here there is at once a suggestion for the beginning of reform by the warrant it gives for first of all "insisting that no additional gasholders shall be erected anywhere for taking care of peak loads." There is already a long list of places where gas is transmitted at high pressures to reinforce low-pressure storage systems, and avoid the necessity of increased holder capacity.

The author concludes as follows: "What we are certainly coming to is the entire abolition of the hundred-year-old gas pressures, with the gasholders which cannot survive them, and the service of gas at so-called high pressures—though they would not be high as compared with steam and compressed air pressures—directly to every consumer. . . . Gas consumers are requiring higher pressures. The obsolescent fishtail burner was satisfied with a pressure of 1½ inches of water. The incandescent mantle gives much more light for gas consumed; but it demands higher pressures. Higher pressures are called for where gas is used for heating purposes; and much higher pressures are required for gas-engines. Gas should be brought to each consumer at a pressure high enough to require a regulator; and this could be individually adjusted to any pressure required, so that everyone could be using it at its best, according to the use to which it was applied."

Commenting upon the article noticed above, "Engineering Record" made the following remarks:

The gasholder problem, which so vexes the spirit of enthusiasts for the betterment of civic conditions, is one which will eventually assume a more serious form; and it is just as well for municipal engineers to keep it in mind, at the same time keeping their minds open on the subject. Mr. Richards states his case against the gasholder enthusiastically and vigorously. Probably most people, including some gas engineers, will agree with him that the gasholder is a hideous object, and its presence in any residential or commercial part of a city causes a great deterioration in property values in its vicinity. This deterioration not only detracts from the income of the owners of the property, but also diminishes the taxes paid to the city as a whole. It must also be admitted that methods of distributing gas under high pressure are rapidly being introduced. It is open to serious debate, however, whether in a city like New York, where a continuous supply of gas is indispensable to a large proportion of the people, any sudden change in the methods of wholesale supply, such as a summary legislative order to remove the gasholders would cause, is justifiable. There are some sections of the city given over to manufacturing and storage purposes where the gasholder is not objectionable; and there is no reason for ordering them to be removed from such a location. On the other hand, the presence of a gasholder in a residential section is a serious drawback to every interest except that of the gas company. If high-pressure distribution of gas will permit the removal of these offending structures, it is something to be considered carefully, not only as a detail of gas distribution, but also as an important measure of city improvement. It is highly desirable, however, that high-pressure distribution should be thoroughly investigated before it is ordered into use anywhere. We suffer enough, even with low-pressure distribution, from the escape of gas from street mains. What the nuisance would be were the mains put under heavier pressure, it is fearful to contemplate. The investment in street mains for low-pressure service is very heavy, and the reconstruction of such a network for the purpose of putting on materially greater pressure would be an extremely costly undertaking, which should not be inaugurated unless the benefits from it were amply sufficient to warrant such expense. Where high-pressure gas is delivered to service-pipes, special regulating-valves are generally introduced; and the whole system is installed as a unit. It is questionable whether an old system could be made over for such a purpose. The usual problem, therefore, resolves itself into one of distributing gas through high-pressure supply mains to the existing system of pipes, into which it should be admitted through some form of pressure-regulating device. This is the view of the matter which is generally expressed to-day. It is something upon which far more information is needed than is now generally available. Just how and when that information will be furnished is hidden in the future; but it seems safe to say that it will eventually be supplied by the gas companies, when some municipal ordinance is passed requiring a gas company to propose a substitute for its gasholders within a definite period of time, after which the holders must be removed.

Visit of Marine Engineers to Beckton.

On Saturday, the 27th ult., the members of the Institute of Marine Engineers paid a visit to the Beckton Gas-Works. Before proceeding to the gas-manufacturing plant, the visitors were shown round the constructional, repairing, and tool-making shops. They then inspected the retort-houses, the largest of which now in use is 510 feet long and 100 feet wide. It contains 405 retorts, and will produce 5½ million cubic feet of gas per day. Considerable interest was shown in the mechanical arrangements for charging and drawing the retorts. After inspecting the other portions of the works, the party were taken by rail to the pier, and shown the cranes and other machinery for unloading the steam-colliers; the power being equal to lifting 12,000 tons of coal per day. The coal-testing plant proved very interesting to the visitors. Refreshments were provided by the Company, to whom, as well as to Messrs. Solomon, Rainey, Hunter, and Wheeler, under whose guidance the inspection was made, a hearty vote of thanks was accorded.

Waverley Association of Gas Managers.—The ninety-fifth meeting of the Association will be held in the Cathedral Hotel, Edinburgh, on Friday next, under the presidency of Mr. R. W. Cowie, of Dalkeith. According to the programme issued by the Hon. Secretary (Mr. C. Hamilton, of Loanhead), in addition to the address of the President, any other "competent business" will be discussed. The President and officers for the ensuing year will be appointed. In the afternoon, the members will dine together, and have an excursion to Dalmeny. By permission of the North British Railway Company, they will be conducted across the Forth Bridge, and, if they desire to do so, can return to South Queensferry by boat.

GAS PUBLICITY PROPOSALS.

Conference of Gas Undertakings' Representatives in Manchester—Basis of the Scheme Approved.

Convinced of the importance of the proposals put forward by the Publicity and Special Purposes Committee of the Institution of Gas Engineers, and believing it to be desirable that a conference should be held of the representatives of gas undertakings in Lancashire, Yorkshire, and the surrounding districts, Alderman F. S. Phillips, the Mayor of Salford and Chairman of the Gas Committee of that Corporation, convened a meeting to be held at the Salford Town Hall on Monday of last week, May 29, so that "the matter might be discussed to the mutual benefit of all concerned." There were nearly a hundred present at the conference—representing gas companies and municipal undertakings in the following towns: Batley, Birkenhead, Bradford, Birmingham, Brighouse, Chester, Chorley, Doncaster, Halifax, Heywood, Hyde, Huyton, Keighley, Leek, Longwood, Liverpool, Littleborough, Marsden, Matlock Bath, Mossley, Oldham, Ossett, Radcliffe, Ramsbottom, Rochdale, St. Annes-on-Sea, Stretford, St. Helens, South Shields, Stalybridge, Sowerby Bridge, Stockport, Warrington, Wallasey, &c. The Publicity Committee of the Institution of Gas Engineers was represented by Mr. F. W. Goodenough, of the Gaslight and Coke Company, London, Mr. Edward Allen, of Liverpool, Mr. T. H. Duxbury, of South Shields, and Mr. Robert Watson, of Doncaster. Mr. R. G. Shadbolt was unable to be present, and "wired" to that effect.

The Mayor of Salford (Alderman Phillips) presided at the conference. In the course of his opening address, he said that the more he thought about the scheme, the more was he impressed by the importance of it. If advertising was to be effective, it was his opinion that it should be carried on with persistency. He agreed that the time had come when they must put more strongly before the public the possibilities of gas, not only as an illuminant, but for heating, cooking, and power. If the proposals of the Publicity Committee were approved, as he hoped they would be, then they must see that the North of England had its fair share of the benefits to be derived from the scheme. While of opinion that a contribution of 2s. 6d. per million cubic feet of gas made was not too much for the purpose, he confessed that he thought a more moderate amount would probably ensure the bringing into the movement of the whole of the undertakings in the country. He thought that everybody should come into the movement, for the greater number in it, the greater would its success be.

Mr. F. W. Goodenough, at the call of the Chairman, then addressed the meeting. He remarked that as the "Memorandum," prepared and presented at the London meeting on April 10 of representatives of gas undertakings, set out very plainly the views of the Publicity Committee on the scheme, he thought it might be well if he read it to the conference—especially seeing that there were present some gentlemen who did not attend the London meeting. Before doing so, however, he desired to say that the Mayor of Salford had correctly interpreted what the Publicity Committee aimed at. This was not a London scheme. It was intended to be a National movement for the benefit of the whole industry; and he felt very strongly that unless the North of England did come into the scheme, it would be useless to proceed with it. [Mr. Goodenough then read the "Memorandum," which has already been published.] He proceeded at length to explain how the money was to be expended, giving the names of the papers, journals, and magazines intended to be placed on the advertising list, in sections, with the respective estimated cost per annum. He argued that it was no use starting in a small way, as some had suggested; for, as the Chairman of the conference had said, advertising, to be effective, must be persistent and well done. They could not, as he put it, "make bricks without straw;" and in his opinion 2s. 6d. per million cubic feet made was small enough. He added that, from the calculations he had made, and the experience he had had in advertising, he was of opinion that, if they were to make a reasonable and effective impression with this scheme, a sum of £30,000 a year would not be too much.

Mr. Edward Allen (Liverpool), who said he spoke, not only as a representative of the Publicity Committee, but as Engineer for the Company he served, remarked that his Directors were satisfied that this was a good thing, and that 2s. 6d. was not too much. To attempt a small scheme would be waste of money. He went on to point out that the Commercial Sections of the Manchester District Institution of Gas Engineers had already discussed this matter, and unanimously decided that such a scheme was necessary. Therefore it could not be said that Lancashire and Yorkshire had been lagging behind in the matter. Those present knew perfectly well of the competition they had to face; and if it were true that the electricity undertakings were to raise £50,000 for advertising purposes, surely the gas undertakings were justified in trying to raise £25,000. His hope was that every gas undertaking in the country would recognize the importance of the scheme, and take part in it, and subscribe liberally. He agreed with Mr. Goodenough that 2s. 6d. as a basis was low enough, if the proposals of the Publicity Committee were to be effectively carried out. The scheme was so clearly set forth in the "Memorandum" that it was like "flogging a dead horse" to speak further about it.

Mr. T. H. Duxbury (South Shields) was next called upon by the Chairman, and, in the course of his remarks, said that the gas companies and corporations on Tyneside had already expressed their willingness to join the scheme on the 2s. 6d. basis. The time had come when a vigorous campaign in favour of gas was necessary.

Mr. Watson, as representing the Gas Institution, supported what had been said by his colleagues. He illustrated by statistics how gas companies in the United Kingdom had, during the last ten years (particularly the last five years), increased their output of gas as compared with municipal undertakings—a fact he attributed largely to the advertising which had been done by the companies.

Mr. S. Meunier (Stockport), who followed, said undoubtedly the general scheme was a very good one; and something of the kind was absolutely necessary if they were "to keep their end up." At the same time, he recognized there might be some difficulty in certain cases to get corporations to agree to the 2s. 6d. basis.

In the subsequent discussion, a few representatives present inclined to the opinion that it would be better to start the scheme by asking for a more moderate sum than 2s. 6d. per million cubic feet of gas made; it being argued that, while directors of the companies would readily recognize that this was not too much, there might be a difficulty on the part of chairmen of gas committees convincing their colleagues and their respective councils as to the wisdom of voting such a sum at the outset. There was no voice raised against the scheme really; and the only point on which there was any difference of opinion at all had relation to the amount to be contributed to the scheme by the respective undertakings.

The subject having been thoroughly discussed in all its bearings, the Chairman endeavoured by a show of hands to get at the sense of the meeting. There were some present who were not in a position to pledge their respective directors or gas committees as to the amount to be subscribed. In the end, there was a vote taken as to the scheme submitted, apart from the contribution; and on this the meeting was unanimous. Then, on a show of hands, it was agreed that it be a recommendation from the meeting that the contribution to the scheme be on the basis of 2s. 6d. per million cubic feet of gas made—only one voting against. "That," said the Mayor, "I take to be the sense of the meeting;" and all agreed.

A vote of thanks was accorded to the Chairman, on the motion of Mr. T. B. Ball (Rochdale), seconded by Mr. Goodenough.

Subsequently, on the invitation of the Mayor, those present partook of light refreshments in the Assembly Room of the Town Hall.

PERSONAL.

Mr. A. W. Grey has been appointed Assistant to Mr. Frank Livesey, Assoc.M.Inst.C.E., the Engineer and General Manager of the Maidstone Gas Company. Mr. Grey served a term of seven years with Messrs. John Abbot and Co., of Gateshead-on-Tyne, was for two years with Mr. A. B. Walker, Engineer and Manager of the Walker and Wallsend Union Gas Company, and has been for seven-and-half years with the Maidstone Gas Company.

OBITUARY.

The death took place last Saturday week, after a long illness, of Mr. John Henry Strange, who was for many years Secretary of the Windsor Royal Gaslight Company. Deceased, who took a prominent part in public affairs, was 64 years of age.

The death is announced of Alderman Thomas Briggs, J.P., Deputy-Chairman for many years of the Gas Committee of the Manchester Corporation. He was in his 81st year; but his death was quite unexpected, as he had been out motoring the previous day, apparently in his usual health. At the funeral, which took place last Wednesday, the Gas Department of the Corporation was represented by Mr. J. G. Newbigging, M.Inst.C.E., the Engineer, Mr. Frederick Price, the Superintendent, several of the officials, and Mr. W. Gibson, representing Alderman Gibson, the Chairman of the Gas Committee, who is on the Continent.

Visitors to the Granton (Edinburgh) Gas-Works.—Mr. W. R. Herring writes that, as some members of the Institution of Gas Engineers will probably be visiting Edinburgh during the holding of the annual meeting in Glasgow, he would like it to be known that the Granton Gas-Works will be open to their inspection on presentation of their cards at the entrance gates.

Differential Prices at Stretford: A Correction.—Mr. H. Kendrick writes to point out that our report of his remarks on this subject at the meeting of the Manchester District Institution at Doncaster, given in the "Journal" last week, does not convey exactly what he stated. He says his Company's charges per 1000 cubic feet are as follows: For lighting and cooking—Under 50,000 cubic feet per quarter, 2s. 3d.; over 50,000 cubic feet, 2s. 2d.; over 500,000 cubic feet, 2s. 1d. For power and industrial purposes—Under 500,000 cubic feet per quarter, 2s.; under 1 million cubic feet, 1s. 11d.; under 2 millions, 1s. 10d.; and over 2 millions, 1s. 9d.

GAS AT THE CORONATION EXHIBITION AT SHEPHERD'S BUSH.

More popular than ever is the gas exhibit the Gas Companies' Joint Exhibit Committee have brought together at the "White City" in what last year was known as the Decorative Arts Building but is this year called the Industrial Section (Building No. 14). Before describing the display, it may be mentioned that the constitution of the Committee to whom the organizing of the exhibit, year by year, has been entrusted by the contributing gas undertakings has been altered somewhat by four additions and one retirement. Mr. D. Milne Watson is still the Chairman; Mr. F. W. Goodenough, the Hon. Secretary and Treasurer; and the other old members are Mr. A. E. Broadberry, Mr. J. W. Helps, Mr. Alex. A. Johnston, Mr. Stanley H. Jones, and Mr. F. M'Leod. The member who resigned is Mr. S. Y. Shoubridge, who felt he had sufficient work to do this year in the public display line at the Festival of Empire Exhibition at the Crystal Palace. The four new members of the Committee are: Mr. R. W. Edwards, Mr. D. H. Helps, Mr. W. E. Price, and Mr. Hanbury Thomas. Mr. Edward Pilbrow, who has at his back experience gained at all these exhibitions at Shepherd's Bush, is again the Superintendent of the exhibit; and it was under his guidance that an inspection was made of the latest display by a "Journal" representative last week.

The Committee have done remarkably well this year, and have considerably increased the popularity of the show and the effectiveness of the demonstration. In both respects, the exhibit is much more imposing than last year—this having been made possible by the ground area occupied having been extended by the addition of a space 100 ft. long by 15 feet deep, running parallel with the space tenanted last year. The building and the suite of apartments forming last year's stand remains, and so does the show-room, but both are newly furnished, and with gas equipment up-to-date. Through the relief afforded, however, by the new section, the old show-room is not so crowded as last year; and visitors can get about freely among the exhibits, and make an individual examination of the features of each one. This is a distinct advantage.

Artistic Lighting and Domestic Utility.

We will first make a rapid survey of the old section. The central attraction here is, of course, the building, comprising the oak-panelled saloon, kitchen, bath-room, and bed-room. Taking the whole combination, it is very attractive and chaste in the matter of the furnishing, down to the smallest detail of the gas-fittings. It demonstrates that gas can be applied for lighting and heating in highly artistic forms, in harmony with the most exquisite surroundings; and, if this can be done, as it is done, then it follows that there is no situation of less artistic merit to which it cannot be adapted. In order to extinguish a common belief, we have to prove by demonstration that the one-time conventional methods of applying gas have given place to something that occupies a plane equal to that of any other illuminant. This exhibit does this, both in manner and form that it good; and it also publicly disposes of the assertions of the electricians that the gas industry is for domestic

The New Section of the Gas Companies' Joint Exhibit at the Coronation Exhibition.

[From the Show-Room End.]

purposes wedded to a single lighting unit, and that only the inartistic is at its command. The saloon is oak-panelled; the furniture antique. The fire place is a recess built of Pavanzo (Italian) marble; and in the recess is set a Georgian dog-grate, fitted with Edgar's "Blenheim" fire. An oxidized pendant of Georgian design, with six arms, each carrying a candle light, is the central means of illumination; and round the room are six sconce brackets, each fitted with three candle lights. These lights (all by Benson) consume about 2 cubic feet each per hour. The pretty shades with which these lights are fitted are by Louis Dernier. The illumination is good, soft, and well distributed. There are also two standard floor lamps in the saloon—one by Evered and Co., fitted with an upright "C" burner, and the other by Ingram and Kemp, fitted with a "Nico" inverted burner. There are two table lamps—one by the New Inverted Company, fitted with a "Nico" inverted burner; and the other by Messengers, fitted with a "C" burner. We will not say anything about the individual characteristics of the fittings. They are all of high excellence in design and finish. The fixed lights are all controlled by the pneumatic lighting system.

Turning to the kitchen, the utility of gas as the most convenient of all domestic servants is seen. It illustrates how cooking, water boiling, coffee roasting, ironing, and all domestic requirements in which heat is needed can be performed by gas, and at a moderate expense. A Main gas-cooker is in the fire place. A Davey and Roberts' coke water-circulating boiler is seen; and a Wilson and Mathieson's gas water-circulating boiler occupies another position. Richmond's "Blackpool" portable boiler is on view, as well as one by Sugg and Co. Gas-irons bear the names of Fletcher, Russell, and Co., Cannon, and Wilson and Mathiesons; and grilling-stoves are on view by the same makers. A triple ironing-stove, with hood, by Fletcher, Russell, and Co., has found a place here. On the table is observed a "Uno" coffee roaster. The hot-water circulating boilers are connected up with a sink; and so it can be demonstrated to the visitor how rapidly a large supply of hot water can be procured by the use of gas. There is also a two-light pendant connected to a pneumatic switch. A T-pendant serves for the illumination requirements of the kitchen.

In the bath-room, there is a full-sized bath; and the fittings are by Parkinson and Maughan. For the supply of hot water, there are, in working order, the new "Teba" geyser, and the "Gacylote" automatic cylinder. These supply the bath and washhand basin. Over the latter is fitted a "Pearl" shampoo geyser. Among other useful things on view is a hot-water towel airer, and a three-tube Parkinson radiator. The lighting is by two brackets—one being a combination bracket by Kempton and Sons, with an upright incandescent burner, and an attachment for curling-tongs and for a small kettle for obtaining shaving water. The other bracket is fitted with a "Nico" inverted burner. The decoration of the bath-room has been improved. Instead of plain walls, tiled paper has been used—white for the upper part, and a blue dado at the lower part. This has a very pleasing effect.

The bed-room has been fitted up after the early Georgian period. The bedstead is a four-post one, covered with figured green satin and plush velvet. The fire-place is occupied by one of Main's latest pattern barless fuel stoves, with boiling-ring on

The New Section of the Gas Companies' Joint Exhibit at the Coronation Exhibition.

[From the Laundry End.]

top. In this, long-tapered fuel is employed, inclining towards the back. The lighting is by inverted burnered brackets each side of the bedstead, and a two-light inverted pendant over the dressing-table.

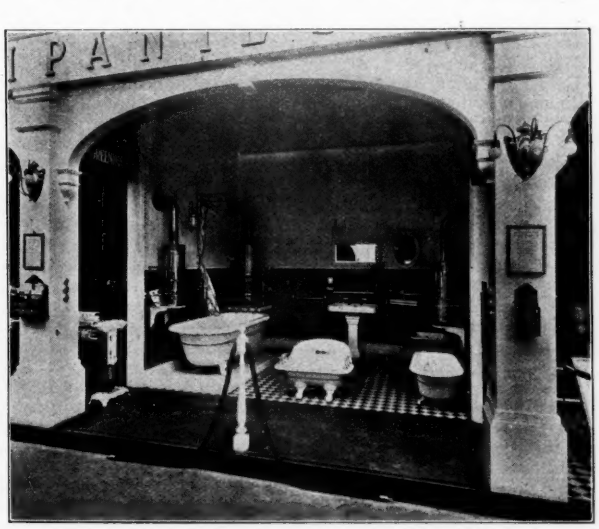
In the Old Show-Room.

Separating the suite of rooms just described is a passage way; and there the Committee have retained for the lighting the two large gilded Venetian lamps, whose great attraction is their gorgeousness and imitation of antiquity. They are both fitted with clusters of four Hotten inverted burners.

In the show-room, there is an extensive display of modern exhibits—all being carefully selected as fairly typifying the modern class of domestic gas-fittings. Being only typical, the visitor (after he has examined this room, in conjunction with the one on the new space) must be duly impressed with the vast range of choice that is offered to him, whether it be for lighting, heating, or cooking. The six fire places are fitted with overmantels, testifying to the high grade of work to which Fletcher, Russell, and Co. have attained in dealing with iron for the production of their most artistic furnishing in this particular line. The fire place in these times plays an important part in the making of a room; and there is no room in a house that the firm named cannot improve from the great variety of suitable designs that they can offer. Here we have a drawing-room overmantel of the Adam design, fitted with a Davis barless fire, in armour-bright finish. In the grate of a dining-room overmantel is fixed one of "Tilley's" fires. Then there is an imitation oak overmantel, suitable for use in a study, library, or such-like apartment, fitted with an Imperial "Quintin" single-bar fire. In the fireplace of an artistically designed overmantel, with tiled back and hearth, and of a character suitable for a hall, is an Arden Hill fire, armour-bright finish, with "Thermo" fuel, and single bar. The fire-place of a bedroom or nursery overmantel contains a Cannon "New" fire, finished in black, with long fuel, and a minimum of bar for retaining the fuel in position. Another grate is fitted by Fletcher, Russell, and Co.'s "Palermo" fire, with the firm's latest make of fuel, to the production of which they have been devoting considerable attention. This fire is fitted with a non-lighting-back burner; and it is supplied with a loose front fret. Other fires are also exhibited on a stand—such as Arden Hill's brown enamelled fire, fitted with a nursery burner, Fletcher's "Tokio" and "Borneo," Wright's large "Druid," with boiler burner at the side, Davis's barless fire with "Pyro" pillars (a top fire-brick keeping these in position), Wright's "Warlock" fire, with an extra large canopy. This has a flue adjuster at the back, so that the flue-pipe can be fixed at any angle to suit the shape of the grate. The radiator is also in evidence—two types being demonstrated by one of Wright's eight double-columned gas steam radiators and one of Fletcher's "Floresta," with argand burners.

From heating, attention is turned to cooking; and the various features of various cookers are pointed out by our guide and his assistants. Mention is made of the exhibits here just in the order in which they were viewed, without preference. It is noticeable how the makers have all adapted to their cookers (the advantage being great) plate-racks and enamelled protecting back plates, and, in some instances, hoods. Housewives recognize the value of these auxiliaries in connection with cleanliness. The Imperial cooker has a plate-rack and enamelled plate suspended at the back on two uprights, so that the hot-plate is not in any way interfered with by the attachment. The door of the oven is fitted with a turn handle, and not merely a latch. Sugg's double "Regency" cooker on a stand, and with a spacious top, is seen. The hot-plate is fitted with a griller and with four boiler burners. Here is a Davis cooker, with top plate that can be raised and lowered and fixed in any position. It is called a screwless cooker; the design being such that the minimum number of screws is used. As in most other makes of cookers, the burners are removable, having no fixed connection; and the deflectors rise and fall, so that they can be used for either toasting or boiling. The enamelled crown plate has a small trough provided in front, in order to catch any overflowing water or grease, thus preventing either running down the front of the cooker, and so disfiguring it. Arden Hill's "Acme" cooker is also shown here; and among its features are two burners, with separate taps, to the grill, so that one or both may be used at will.

There is an excellent assortment of pendants and brackets—from the plain to the highly ornate, and in any style to suit both situation and pocket. Without exception here, the inverted burner is the vogue; and so the old styles of pendant and bracket are not in evidence. The pendants were supplied by Ingram and Kemp, J. & W. B. Smith, Messengers, Whitehouse, New Inverted Company, Best and Lloyd, and C. Kempton and Sons; and when we have said this—well we have said enough to indicate the high-class work in the fittings on view. If one wants the Georgian, Adam, or any other handsome style, here it is; in short, the display shows that all tastes can be gratified. Other fittings—brackets and so forth—are on view (several exposed on the useful display stands made by Dean and Beal, Limited) by some of the firms already named, together with George Hands and Co., Hodge and Co., Falk, Stadelmann, and Co., and Evered and Co. "Nico" and "Bland" inverted burners are the ones principally adopted; and the beautiful shades are by Louis Dernier, and Ellis, Simpson,



A Front View of the Bath-Room in the New Section.

and Saunders. There is a hall lamp on view by Ingram and Kemp that is exceedingly attractive; being fitted with four-panel artistic "Cloisonne" shades. A figure statue lamp, "Echo de la Montagne," by Evered and Co., is very choice. It supports, in a very graceful manner, three bijou inverted burners. The ignition and extinguishing of the lights is by the "Pneumatic" switch and "Telphos" systems.

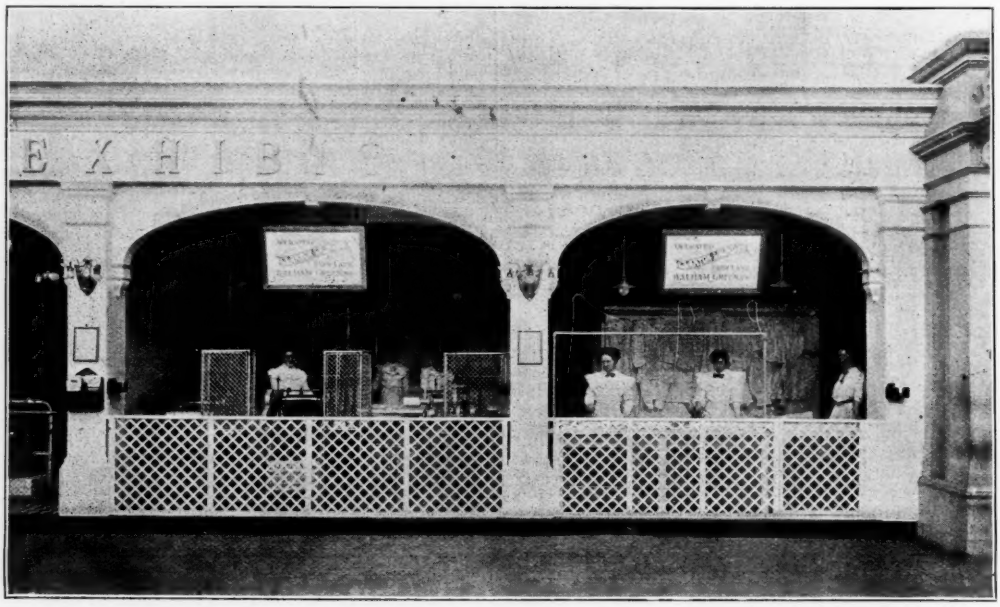
In the New Section.

As we have said, the new section occupies a space 100 feet long by 15 deep; and it makes a splendid sweep for display purposes. It is divided into a show-room, occupying 35 feet, a bath-room taking up 15 feet, a gas-engine and compressor room also absorbing 15 feet, and a laundry to which the remaining 35 feet space is devoted. The whole of the front is in broad open archways, which, with the pillars and the bold facia, are finished in white "Ripolin," this serving as a contrast to the "Coatostone" finish of the building erected last year. Along the facia in 12-inch deep gold-faced letters, with red sides (thus causing them to stand out prominently), are the words "The Gas Companies' Joint Exhibit." Each of the front pillars carries an oxidized bracket with hammered back-plate by the New Inverted Company, and supporting three "Nico" bijou inverted lamps. Two advertising signs (which are seen directly one approaches the stand from either direction), by C. & W. Freeman (controlled by Richmond's automatic flasher), are fitted with glass sides, lettered respectively with "Gas for Advertising," "Gas for Greenhouses," "Gas for Lighting," and "Gas for Power."

At one end of the outside of the stand was noticed a Richmond "Bavarian" fire, fitted with one of Mr. Killingworth Hedges' recuperators, and towel-horse attachment. There is also here an Imperial stove with a slab or hob on either side—one being fitted with a boiler-ring. This fire is suitable for situations where a recess is available into which it can go entirely. This stove is made to fit standard openings.

One is not long in the new section of the exhibit, before becoming convinced of the value of it in displaying goods, and what is of more importance in attracting the sight-seeing public. This new section has this effect in high degree; and we heartily congratulate the Committee on the addition. We will not describe the exhibits at length. The makers of gas-fires, for instance, have now attained such a pitch of perfection in their productions that it is becoming year by year more difficult than ever to make a selection. There is nothing crude about the fires seen mounted here on two teak pedestals at the rear of the show-room portion of the new section. Most of them are in enamel finishes of different colours. There are Wilson's "Bijou," "Idol," and "Elite" fires, Parkinson's "Agate" and "Basil," Main's "Dependable" and "Cymmetrical," the Imperial "Quintin" and "Quadrant," Wright's "Stadium," the Cannon "Solar," and Davis's No. 2017. May be there are others; but those named were noted. Radiators by Richmond and Davis are also shown.

Noble examples of cooking-stoves and ranges (which it was impossible to exhibit in the limited space last year), large and small, double and single, are set conveniently for examination about the place—all having individual meritorious point, and designed to give the maximum convenience in the kitchen. As one looks at one or other of these really excellent pieces of work, and remarks the multifarious conveniences that have been gradually incorporated, the popularity of the gas cooker among the presiding geniuses of the kitchen can be appreciated. Upon the various stoves and ranges, most of them with



A Front View of the Laundry Section.

[Operated by the Claxton Laundry.]

plate racks and hoods or wall protecting screens at the back, are observed (in the order inspected) the names of Wright, Sugg, Parkinson, Richmond, Fletcher and Russell, and Cannon. The Cannon "County" cooker has special attention drawn to it by the copper side boiler; and one of the Imperial cookers by the reversible plate rack which can be used horizontally or vertically. In the vertical position it has a trough at the bottom, by which any condensation or drainings from wet plates can be drained away down the inside of one of the side standards supporting the rack. Mention must also be made of Wilson's No. 1 "Advance" cooker, with extended hot-plate, for the design of which Miss Helen Edden was largely responsible. It has a comprehensive range of conveniences. The cooking structures are now getting—indeed they are—veritable works of art. A "Clyde" griller on a stand by Richmond claims notice; and hard by there is Parkinson's oven-griller, which is a very serviceable combination where space is a consideration. It is in one an effective griller and a useful oven, with a side boiling-burner. The oven has bottom burners, and when in use, the browning-shelf can be placed at the top of the oven just under the grill; the waste heat making the hot-plate of service in warming plates or heating water—the side boiling-burner being available at the same time. When in use as a griller, the loose lids may be removed, and kettles and saucepans boiled simultaneously. The "Avon" water-heater, bearing the name of Richmond, is on view. Among sundry exhibits is noticed a set of Hutchins' steamers, and a patent "Quick" boiling kettle, by Nettlefold and Sons. For this it is claimed that it boils in one-third less time than the ordinary kettle; and to the housekeeper time means money just as it does to the business man. Saucepans are made on the same principle as the kettle.

Lighting fittings of all kinds—some of them real works of art—are to be inspected. To mention them would be merely to reproduce much of what was said regarding the lighting fittings in the show-room of the old section—the makers all being the same. Inverted lighting, it is almost unnecessary to say, holds sway.

It ought to have been stated before touching upon the exhibits that the new show-room has flat-faced pilasters at the back, between which is stretched green cloth. The pilasters themselves, and other surfaces not covered with the green cloth, are painted with white "Ripolin." The effect is very pleasing.

The Bath-Room.

Next we come to the bath-room in the new section. This has been equipped completely by Ewart and Sons; and everything is to be seen at work. The public likes demonstration. The room forms a handsome part of the section; everything in connection with the place having been thoroughly well done. A full-sized bath, with shower spray, first attracts notice; and this, it is seen, is supplied by either a "Califont" or else a "Lightning" geyser. Beneath it is a large marble slab, slightly sunk from the outer level, so as to catch any splashings of water. We know that children at times are frightened at being put into a large bath of water; and right in the foreground visitors have their attention arrested by a perfect bath only 3 feet long by 18 inches wide, in conjunction with which an "Elite" geyser is working. There is a "Sitz" or hip bath, by which one is able to get a supply of hot or

cold water from any position. A spray can be obtained from below, a douche from the back, and an ordinary supply from either side. A fitted foot-bath is among the exhibits; as well as a lavatory basin combined with which is a "Brilliant" shampoo geyser. A manicure table is fitted complete with a "Gem" geyser. The walls of the room (which are tastefully decorated with Lincrusta in white and green) are furnished with all the requisites for a properly equipped bath-room—such as mirrors, towel-rails, soap-dishes, tooth and other brush racks. The lighting is by three "Nico" inverted gas-burners.

Gas Power and Compressed Gas.

The succeeding sections have a dual worth. In the first place, they demonstrate the value of gas for power purpose, and the demonstration is put to serviceable ends. There is, in the next division of the stand, a 6-horse power "National" gas-engine, which is used for driving a Keith-Blackman compressor of the "A" type. This supplies high-pressure gas to the machine and hand irons, and the lamps in the laundry section. There can also be seen in use here Potterton's "Victor" circulating boiler, Wright's "Sun" boiler, Wilson and Mathieson's "Model" circulator tank and boiler (fitted with glass front for exhibition purposes), and Wright's "Garajo" boiler and radiator for motor houses. The boiler can be fixed outside the motor-house for safety, to overcome any question as to insurance in view of the storage of petrol. There is also on view a model greenhouse, showing a section of the Cutmore water-heater, as manufactured by Mr. W. Edgar, of Hammersmith. Outside forms of lamps are mainly used for lighting this section. We see here Smith's three-burner (inverted) "Silva" lamp, Sugg's three-light "Regent," the "Nico" three-burner "Radio," and Podmore's four-light inverted lamp, together with a three-light "Nico" indoor lamp. All the lamps are operated by the pneumatic switch, which is shown provided with an outer casing, in order to protect the valve against the weather.

A Working Laundry.

Now we come to the admirably fitted-up laundry; and this, with its working machinery and eight expert laundresses dressed in clean, white overalls, bearing the words "Claxton Laundry," attracts, on the busy days of the week (we are informed by the Superintendent of the exhibit), large crowds of interested sight-seers. The laundry, as will have been gathered, is operated by the Claxton Laundry, of Walham Green; the proprietors being Messrs. Fordham and Mason. The gas-heated laundry machines are the productions of D. & J. Tullis, of Southwark Bridge Road. Here are gas-heated and gas-operated machines for ironing shirts, collars, and cuffs, a goffering machine, and five gas-heated hand irons. As intimated in the previous paragraph, the gas for heating the machines and hand-irons is obtained from the Keith compressor in the adjoining section of the stand; the gas being supplied at a pressure of 60 inches. A "National" gas-engine is used for providing the driving power. The laundry is an exceptionally good exhibit for public demonstration purposes; and we think all gas men who visit it will be pleased with what is to be seen. It may be suggested that it offers a splendid opportunity for inducing the proprietors of laundries to visit the display. The laundry is lighted by nine 150-candle power anti-vibrating high-pressure Keith lamps.

High-Pressure Lighting.

In the colonnade at the end of the building in which the exhibit has been housed and facing the Palace of Music, there have been installed five 1000-candle power Keith high-pressure lamps, in place of the three 350-candle power low-pressure lamps that were there last year. The high-pressure gas for the lamps is furnished from the gas-compressing station of the exhibition authorities (supplied with gas by the Brentford Gas Company) which serves the Keith lamps by which the main lighting of the lower part of the grounds is (as in previous years) accomplished.

There is every reason for congratulating the Gas Companies' Joint Exhibit Committee upon the display, which has already attracted considerable attention, and will continue to do so during the run of the Coronation Exhibition, which provides such a feast of spectacular splendour for the pleasure and recreation seeking public.

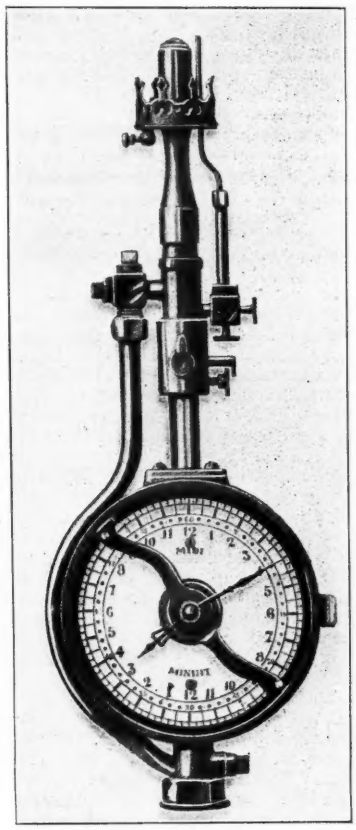
"SECURITAS" GAS LIGHTER & EXTINGUISHER.

M. Granoux, describing in a paper he presented to the recent meeting of the Société Technique du Gaz en France, the "Securitas" clockwork lighters, pointed out that the hour-dial by which it works is a fixed one and is fitted with two hands, like those of an ordinary clock—one making the complete passage over the dial every 24 hours, and thus indicating hours; the other, in one hour, and indicating minutes. The "Securitas" can thus be set with the greatest readiness. The dial is further provided with two index-fingers, which determine the times of lighting and extinction. These are moved by hand (in a direction opposite to that of the hands) over the divisions on the dial—these latter being 288 for the 24 hours, with each division representing five minutes. This allows of the time of lighting or extinction being fixed with this degree of accuracy.

The "Securitas" contains two trains of clockwork, actuated by a single drum. One governs the movement of the hands over the dial, and the other controls the admission or cut-off of the gas when lighting or extinguishing—ensuring certainty in action.

The clock is of the anchor-escapement type, with ruby bearings. It is fitted with a nickel-steel spiral spring, indifferent to variations of temperature and affording constant working of the apparatus. The speed of the escapement is adjusted by a lever placed under the dial, which can be operated without having to unscrew or dismantle any part of the apparatus. This adjustment allows of all the lighters being worked uniformly. The clockwork is constructed to run for fifteen days; but it can be re-wound more frequently if conditions so require.

The construction of the gas-supply to the burner and bye-pass is innocent of cock, or copper or rubber membrane, with their attendant drawbacks. It is formed by a metal box, the lower part of which is traversed by a rod of unoxidizable material. On this rests a metal ball, which changes its position between two superposed seats—thus passing the gas, in turn, to the burner or to the bye-pass, by means of a cam, actuated by the train of clockwork. A new type of mercury-seal ensures the absolute tightness of this part of the apparatus. Lighting and extinction take place very rapidly—within four to five seconds in each case.



The bye-pass flame may be either white or blue, and at the side or in the centre of the burners. The latter position is preferable, as the bye-pass is then triply protected from accidental extinction—first by the mantle and then by the chimney of the burner and the glass panes of the lantern.

Trouble from naphthalene in the mains is avoided in the case of the "Securitas" by using large pipes, and fitting them with plugs for cleaning in case of obstructions.

The small hour-hand is fitted with a special adjustment whereby light pressure with the finger allows of gas being obtained for burning-off a new mantle. Gas may likewise be obtained without opening the "Securitas," by fully turning the screw placed under the distributor.

The "Securitas" is supplied in various forms—*e.g.*, with a steel-plate cover for the dial, held in place with a bar (as for the mouth-piece of a retort) which can be opened only with a special key. This protects the apparatus and secures it from being tampered with. The lighter may be placed in lamps of various types, while other models can be obtained for lighting two or three burners in a single lamp, providing for the extinction of one or two burners in the course of the night and of the remaining one at the time of extinction over the whole service. Further, the makers construct models of the apparatus for working at a distance, suitable for installation in the bases of lamp-standards or in a special box fixed in a wall.

An attempt to represent the intensity of sunlight in candle power has been made by a Professor at the Paris Observatory. The number that has thus arrived at runs into no less than twenty-nine figures.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Thirty-Eighth Annual Congress.

In the "JOURNAL" last week, we gave an outline of the proceedings at the last annual congress of the French Gas Association, which was held at Marseilles from the 22nd to the 25th ult., under the presidency of M. HENRI MARQUISAN, whose Inaugural Address was noticed. We are now in a position, from an account of the meeting for which we are indebted to an esteemed journalistic *confrère*, to give some additional particulars.

POSITION OF THE SOCIETY.

It was mentioned last week that the business on the morning of the opening day included the admission of new members. The list is headed by the name of M. Gustave Ador, the Chairman of the Gas and Electricity Company of Marseilles. The membership of the Society now stands as follows: Ordinary members, 656; associates, 149; honorary members, 23—total, 828. In the last-named class is included the President for the year of the Institution of Gas Engineers. M. Marquisan explained that Mr. Alexander Wilson, who at present occupies the position, was, in accordance with custom, elected at the last congress, and that the nomination submitted for the approval of the members applied to his successor. The office-bearers for the current year are the same as before—M. Marquisan retaining the presidency till the close of the next congress. The Society, it may be remembered, is supported largely by contributions from gas companies; the total receipts from these sources amounted to 28,660 frs. (£1146) —an increase of 1510 frs. (£60) on those of the year 1909.

REPORTS OF COMMITTEES.

The report presented by the Committee opened with references to the members removed by death, and then reviewed the work of the past year. It included the fourth sitting of the International Commission on the Unification of Pipe-Threads, some account of which will be found in the report presented to the Institution of Gas Engineers by Mr. James W. Helps, and given in another column. Reference was also made to the decision come to by the Committee towards the close of the year, to constitute several Special Committees. These have got into regular work, and have done something upon which to report. It was also announced that, as mentioned in the "JOURNAL" last week, the International Photometrical Commission would meet at Zurich towards the end of July, under the presidency of M. Th. Vautier, who will give an account of their proceedings at next year's congress. Allusion was made to the efforts of the Central Committee for the sale of coke during two years, under the stimulating presidency of M. Rouland, the Managing-Director of the Paris Gas Company, to bring about a more general use of this useful product for domestic heating as well as for industrial purposes. The result has been the opening of a competition next year among makers of appliances for the utilization of gas coke; and prizes will be awarded for those considered best.

In addition to the awards of medals by the Government to gas-works employees, the Society gave 23 silver medals and 40 prizes of 200 frs. for long and meritorious service. For papers read at last year's congress, M. Roche received a prize of 250 frs. for his communication on "The Use of Aluminium in Gas-Works;" and M. Bonnet one of like value for his paper on "Steel Gasholder Tanks with Bulging Sides." Translations of both of these papers were given in the "JOURNAL" at the time. A prize of 500 frs. was awarded to the Société Française d'Incandescence par le Gaz (Système Auer) for a radiator with mantle designed by M. Delage, one of their engineers.

In addition to the report presented by M. Laurain on behalf of the Technical Instruction Committee of the Society referred to last week, M. Guillet submitted one from the Committee on Coal Analysis, and set forth the conditions to be embodied in a purchase agreement to serve as a basis for contracts between gas companies and colliery owners. He also read one from the Committee on Manufacture, in which attention was directed to modern methods of gas making. With regard to carbonization, it was pointed out that the new processes seem to tend in the direction of slow distillation with large charges; and it was thought that they would meet with some obstacles in France owing to the existence of the antiquated system of indicating the quality of gas by tests of its illuminating power. Slow and progressive condensation seemed now to be losing ground; and managers were beginning to work in the opposite direction. In France, the new processes of purification had not yet been introduced; but it was considered necessary to call to mind those of Feld, Burkheiser, and others. The Distribution Committee directed attention to the employment of the inverted incandescent burner for the public lighting of large cities such as London and Berlin, and also to the use of compressed gas in these cities. This system of lighting had, it was mentioned, already been adopted in Paris and in the larger cities of France, beginning with Marseilles. In conclusion, reference was made to the increasing use of appliances for the automatic lighting and extinction of gas.

The report of the Committee on the Applications of Gas was presented by M. Robert Ellissen. It directed attention to the competition which is shortly to be held, under the auspices of the Paris Gas Company, in connection with appliances for the utilization of gas. At the request of the Society, it has been stipulated, with the view of allowing these appliances to be used in the Provinces, that consideration should be given to the fact that they would be supplied with gas at low pressure—that is to say, at about 12-10ths. The report referred to the efforts made by the Committee to encourage the use of gas for the heating of bakers' ovens. In this connection, an attempt will be made to adapt mechanical kneading-troughs, worked by electricity, to gas-heated ovens. The Committee did not consider that these were the only points to which attention should be directed. Their programme will comprise all questions which, either directly or indirectly, bear upon the production of energy by gas or its bye-products, such as coke and tar.

THE SUPPLY OF COKE-OVEN GAS.

It was briefly mentioned last week that M. Cornuault gave some interesting particulars in regard to what is being done in Germany in the way of supplying coke-oven gas. This subject was not on the *agenda*, but it was dealt with on the invitation of the President; M. Cornuault having lately been travelling in Germany for the purpose of studying it. Before inviting him to address the meeting, M. Marquisan reminded the members that the question was now much in evidence, and it would become more so if the antiquated regulation as to stating the quality of gas according to its illuminating power—a regulation which was out of date, and had been very justly characterized as a "national error"—could be modified.

At the outset, M. Cornuault reminded the members that the utilization of coke-oven gas was by no means a novelty, and that gas produced in coke-ovens had been utilized in France ever since 1898 at Montceau-les-Mines. Last year, the number of coke-ovens increased greatly in Germany, more especially in Westphalia. If the members bore in mind the fact that these coke-ovens have available quantities of gas exceeding 50 per cent. of their production, they would see the importance of this new industrial element, which, sooner or later, would affect the gas industry in certain districts situated in proximity to coke-ovens. This would be the case particularly in the Pas de Calais and the North, to say nothing about France as a whole. Incidentally, M. Cornuault mentioned that the production of illuminating gas in France is estimated at 1200 million cubic metres, or about 42,378 million cubic feet. The distribution of coke-oven gas investigated by him in Germany was in respect of sixteen towns, where the inhabitants were supplied, either partially or entirely, with this gas. The largest installation was at Homburg. In one case, the ovens were furnished with two hydraulic mains—one for the gas of better quality, distributed to the consumers; and the other for the poorer gas, reserved for use on the works. The former gas was taken off between the third and fifth hour of the twenty-four hours constituting the period of carbonization. This gas was purified from tar, but was not deprived of its benzol. The gas was sold at different prices according to the class of consumers; the communes paying only 10 pf. per cubic metre, or approximately 2s. 10d. per 1000 cubic feet. The gas had a high calorific power —about 5200 calories per cubic metre, or 578 B.Th.U. per cubic foot; and it was sent out at a pressure of 60 inches of water, which was fairly moderate. M. Cornuault reminded members that the gas in the suburbs of Paris is distributed at 28 to 32 inches pressure. The principal main for the conveyance of the high-pressure gas was about 30 miles long, and was 20 inches in diameter. It consisted of iron pipes, jointed with lead and india-rubber; and it was tested under a pressure of two atmospheres before being brought into use. This installation served the towns of Essen, Gelsenkirchen, and a number of neighbouring localities. All the particulars he had given showed that the question before the members was one bearing upon a very important scheme for the distribution of gas. How were gas people to regard this industrial movement? The question had two sides. Generally speaking, French gas-works were in a state of progression. They must therefore meet increased consumption by augmented productive plant. Conductors of gas-works placed in the necessary conditions for taking a supply of coke-oven gas could, by applying for it, put themselves in a position to meet greater demands upon them without incurring capital expenditure for extensions. It was true that there were certain drawbacks to the arrangement. In the first place, the variable quality of coke-oven gas must be taken into account. And next, the gas must be furnished at a lower price than it would cost to make it in the usual way.

M. Mallet offered a few remarks on the subject. He agreed with M. Cornuault that the new industrial evolution of which he had been speaking was a double-edged weapon. If the owners of coke-ovens could not dispose of their excess gas at a remunerative price, they would be inclined to go direct to the municipalities, and perhaps take advantage of the period for the renewal of a concession to attempt to oust the gas company. It would therefore probably be wise for the coal gas industry to endeavour to bring about a loyal participation with the coke-oven gas industry. With regard to the fear of strikes, M. Mallet thought there was no ground for it, inasmuch as in the recent strikes of miners the coke-ovens had not been shut down by reason of the increased expenditure and general disturbance which these labour troubles brought about. Besides, a short supply of gas, as a result of labour movements, would occur also with owners of gas-works, who would not receive the necessary supply of coal to enable them to continue working. In conclusion, M. Mallet said he thought the calorific

power mentioned by M. Cornuault was very high. He considered that it should not be more than about 4200 calories per cubic metre, or 467 B.Th.U. per cubic foot.

A few further remarks were made on the subject. M. Bouvier reminded the members that some few years ago he alluded to it in a pamphlet published by the Society as the result of a tour of investigation made by him in Germany. The President remarked that the method of distribution under consideration would abolish, or at all events diminish, the sale of coke from gas-works; and this was a phase of the question which would have to be studied. M. Delebecque pointed out that the colliery owners were already competing, in a different way, with people engaged in the industries concerned with the supply of light and motive power. For some time past, he said, large quantities of coke-oven gas had been utilized in the production of electric energy; and there was to be noticed at the present time in France a tendency on the part of the large colliery companies to erect powerful central stations, equipped with gas-engines, for the distribution of electrical energy in several districts far removed from the place of production.

Increased Use of Gas for Heating.

At this point, M. Cornuault took the opportunity of completing the interesting statistics published by him a few years ago in the course of his address on taking the presidency of the Society of Civil Engineers of France.* The figures he gave, which related to the development of the consumption of gas in Copenhagen and Zurich, furnished proof that the quantity of gas employed for heating purposes progresses much more rapidly than that used for lighting.

M. Robert Ellissen and M. Godinet (the immediate Past-President) offered some observations to the same effect. The former cited an important increase which had taken place in a town in the south-west of France when a reduction was made in the price of gas, and the charges were made uniform for both lighting and heating purposes, thereby dispensing with the double meter. M. Godinet remarked that at first sight, and without complete study, it seemed illogical to retain, in the case of a differential tariff, a higher price for gas used for lighting, seeing that this branch of the business developed much less rapidly than the heating branch.

Further reference to the technical proceedings at the meeting must be left for a subsequent issue.

Marseilles Gas and Electricity Works.

As stated last week, a good portion of the afternoon of the second day of the meeting was occupied with an inspection of the gas-works, adjoining which is the electricity station. Prior to the visit, some particulars of the gas-works, of which a plan (reproduced below) was distributed to the members, were furnished by M. Rolland d' Estape, the Managing-Director of the Gas and Electricity Company. Before giving these, it may be mentioned that it was not until 1840 that gas made its appearance in Marseilles; but the result was not a success. Various companies, both English and French, came forward with offers to light the city; and eventually a concession was granted in 1855 to Jules Mirès, an enterprising man who quickly brought gas into popularity on account of its great convenience. The concession provided for 90 miles of mains. Half-a-century later, when the concession was renewed, the extent of the canalization was about 210 miles; and at the present time it is something like 450 miles. For the public lighting, 9700 gas-lamps are employed; but there are still 1200 oil-lamps—relics of the past—in use in the outskirts of the city. There have been proposals for a general adoption of electricity for the public lighting; but financial considerations have led to the subject being "shelved" till better times.

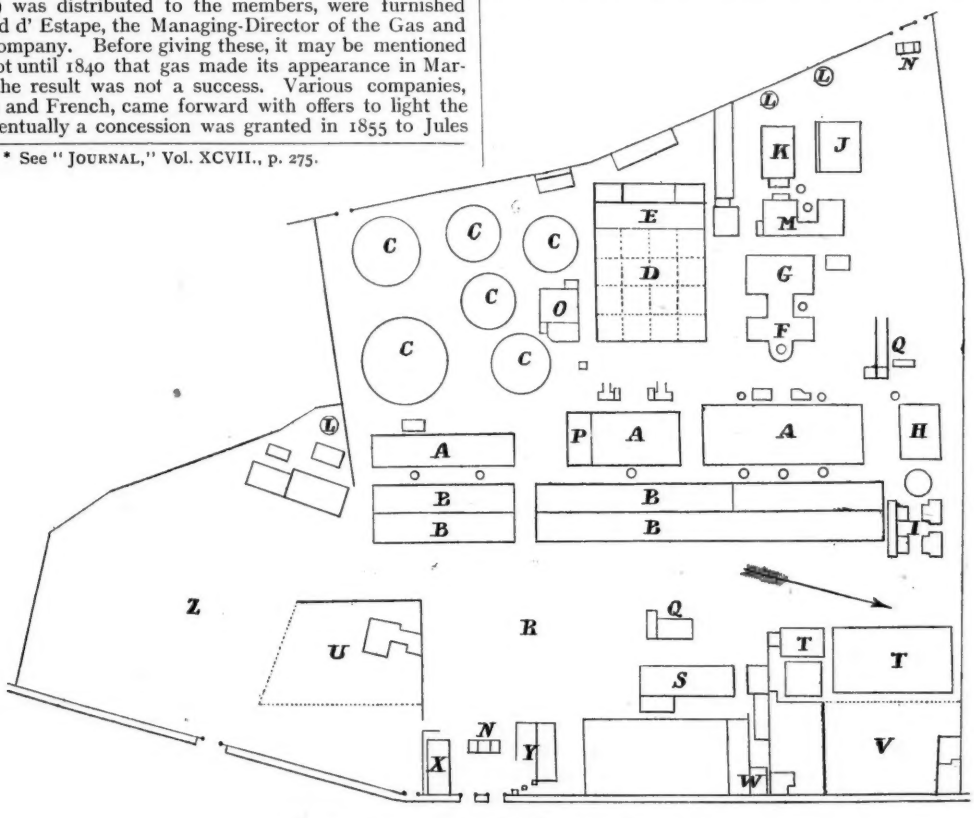
Coming now to the particulars furnished by M. Rolland d'Estape, it appears that the present gas-works date from 1882; and their productive capacity has been gradually increased to enable them to meet the augmented consumption which has taken place of late—the sales having doubled in the past six years. The principal features of the works may be indicated as follows: First of all, there is an installation of vertical retorts on the Bueb system, erected in the retort-house to the left of the workmen's rooms. It has a capacity of about 700,000 cubic feet per day; and it has been in operation for twelve months. Next there is plant for the manufacture of water gas on the Dellwik-Fleischer system. The coke is quenched by water while being conveyed away in a trough. It is the intention to put up a gasholder having a tank with bulging sides, as described by M. Bonnet at the congress last year; but at present only the foundations have been laid. The greater part of the electric current sent out by the Company is supplied to them at high tension by the Société de l'Energie Electrique du Littoral Méditerranéen. The Company, however, have a central station, which serves at once as an auxiliary and a stand-by.

The inspection of the works afforded the visitors much interest, especially the installation of vertical retorts, the modern boilers, with automatic fire-bars and economizers, and the vertical-axis turbines. The other retort-houses contain two and four benches of horizontals. As will be seen from the plan, there are six gasholders; their capacities being 275,500, 290,000, 297,000, 353,200, 530,000, and 628,650 cubic feet. The gasholder connected with the water-gas plant contains about 21,000 cubic feet.

It may not be out of place to mention here that the Chairman of the Company (M. Gustave Ador) was Commissioner-General for Switzerland at the International Exhibition in Paris in 1900, and that for his services in that connection he was made an officer of the Legion of Honour. He has taken an active part in the work of the Red Cross Society, of which he is President. He succeeded M. Henri Germain as Chairman of the Company.

Exhibition of Gas Appliances.

In connection with the congress, there was as usual an exhibition of gas appliances of various kinds, some of which were the subjects of short papers submitted during the sittings.



PLAN OF THE MARSEILLES GAS-WORKS.

A. Retort-Houses. B. Coal-Stores. C. Gasholders. D. Purifiers. E. Revivifying Shed. F. Exhausters. G. Scrubbers. H. Water-Gas Plant and Holder. I. Charging-Stations. J. Sulphate Plant. K. Tar Pits. L. Benzol Troughs. M. Boiler-House. N. Weighbridges. O. Station Meters and Laboratory. P. Workmen's Rooms and Lavatories. Q. Coke-Screening Plant. R. Coke Ground. S. Workshops. T. Basins. U. Engineer's Residence. V. Deputy-Engineer's Residence. W. Foremen's Houses. X. Gatekeeper's Lodge. Y. Coke Sales Offices. Z. Electricity Works.

* See "Journal," Vol. XCVII., p. 275.

UNIFICATION OF PIPE-THREADS.

Report by Mr. James W. Helps.

The following are the main parts of the report on this subject presented by Mr. James W. Helps to the Institution of Gas Engineers, and contained in the annual report of the Council, the principal portions of which were given in the "JOURNAL" last week.

Since the last meeting of the Congress, the matter of the unification of pipe-threads has been actively taken up in Germany, and meetings convened at which the various interests affected were well represented. The result of these meetings was the appointment of no less than seven German delegates to represent that country at the Congress in Paris. The representatives of the other countries were practically the same as those attending the Congress in June, 1909.

The German delegates had prepared a note setting forth their views on the matter, which was circulated to the delegates attending the Congress; and this practically formed the main subject of discussion. It will be remembered that last year it was agreed, in the absence of the German delegates, that no formal recommendations should be arrived at, but that all decisions of the Congress must be regarded merely as expressions of opinion.

A short *résumé* of the proceedings may conveniently be given under the following heads.

Angle of Thread.

The unanimous and strong recommendation of the German delegates for the adoption of the 55° Whitworth angle led to the whole subject being re-opened; and this was naturally the point around which most of the discussion centred, on account of the desire of the American delegates to adopt 60° as the angle of thread. In view of the fact that the 55° angle is almost universally used in Europe, the British, German, and Swiss delegates entered a strong protest against the adoption of the 60° angle; and after a long discussion, it was decided (as unanimity could not be arrived at) to report that Great Britain, Germany, and Switzerland favoured the 55° angle, while America favoured the 60° angle. France, while favouring the 60° angle on theoretical grounds, desired to leave the matter open until the delegates had had an opportunity of consulting French manufacturers and users. It was further decided to obtain the views of Russia, Belgium, and other European countries on this subject before the next Congress.

Form of Thread.

In view of the failure of the Congress to arrive at any decision in regard to the angle of the thread, the profile or form of thread, which depends so largely on the angle chosen, was left over until the next meeting of the Congress.

Form of Tube End.

The practice in America and Great Britain is identical in regard to the coned end of the tube, which is coned to $\frac{1}{16}$ inch measured on the diameter per inch of length. The German practice appears to favour the plain cylindrical end; but as the conical and the cylindrical end are both admitted by the Engineering Standards Committee in their report on pipe-threads, it was decided to adopt the Standards Committee's recommendations, as meeting the views of Great Britain, America, and Germany.

Determination of Gauge Diameter.

The Congress next turned its attention to the question of diameters of the screwed portions of the tubes. It was recognized by all the delegates that the system adopted in Great Britain by the Engineering Standards Committee for fixing the position of the gauge diameter was the most satisfactory, and it was decided unanimously to adopt this system.

It having been settled how and where to measure the diameter, the Congress next proceeded to determine the actual dimension of the standard gauge diameters.

This is a matter of vital importance to interchangeability, as, whatever form of thread is ultimately arrived at, tubes screwed on the American system or on the English system would, if necessary, go together, provided the diameters, pitches, and form of cone were the same.

It was therefore a matter of paramount commercial importance to the British tube industry that the International gauge diameters should be as nearly as possible those decided upon by the Engineering Standards Committee. In thirteen sizes out of twenty-two, the gauge diameters tentatively decided upon practically coincide with the British standard gauge diameters, and their positions on the tube ends lie within the limits of variation allowed by the Engineering Standards Committee. In the remaining nine sizes, the gauge diameters differ to a greater or less extent from the British standard, and fall outside the limits of variation in a corresponding degree.

Pitches.

The pitch is an element of the thread which most vitally affects interchangeability. The German pitches are the same as those adopted in this country, and the German delegates desire that the International pitches recommended should coincide more nearly with the actual British pitches than the pitches recommended at the last Congress, at which the figures for the pitches were rounded off to the nearest tenth of a millimetre. The German delegates desired that the pitches should be stated as so many pitches per 25·4 millimetres. This the metric school somewhat demurred at, and it was ultimately agreed to state the pitches as so many per 100 millimetres as given in column 11 of the attached table. The actual pitches ultimately agreed are the same as the British standard except in two instances, where the American delegates pressed very hard indeed that the pitches on the $\frac{1}{4}$-inch, and $\frac{3}{8}$-inch sizes should be reduced from 19 to 18 threads per inch; and this alteration the British delegates undertook to bring to the favourable consideration of the Engineering Standards Committee.

Length of Thread.

In American practice, the length of thread on the cone end is somewhat shorter than in British practice. The German delegates desired to have a little more even progression than the steps given in the British series; and it was ultimately agreed to recommend the lengths of thread given in column 15 of the table, which it will be seen compare very favourably with the British practice, when the desire of the Americans for shorter threads and of the Germans for more even progression is remembered.

Number of Standards.

The German representatives desired to add two sizes to the present British list, namely:—

$1\frac{1}{8}$ inch nominal diameter with a gauge diameter of 38·0 mm.
$2\frac{3}{8}$ inch " " " " " 72·6 mm.

But it was also felt that it would be to the advantage of user and manufacturer if the number of sizes recommended as standards could be reduced; and it was therefore agreed to follow the practice adopted by the Engineering Standards Committee in their Pipe-Flange Report (No. 10), and place a star opposite certain sizes, with a note suggesting that for general use these sizes be dispensed with. The following sizes were starred:—

$\frac{5}{8}$, $\frac{7}{8}$, $1\frac{1}{8}$, $1\frac{3}{8}$, $2\frac{1}{8}$, $2\frac{3}{8}$, $3\frac{1}{8}$, $3\frac{3}{8}$ inches.

As this arrangement has already been approved in principle by the Engineering Standards Committee in other reports, it was agreed by the British delegates to bring this to their favourable consideration.

General Conclusions.

In view of the export trade of this country, and the very large use made on the Continent of the Whitworth pipe-threads, the British delegates desire to draw the attention of the Engineering Standards Committee to the necessity of following up the work undertaken by the Société Technique de l'Industrie du Gaz en France, so as to safeguard the decisions which may be arrived at by that Conference, bearing in mind the fact, which was repeatedly brought to the notice of the Conference both by the British and German delegates, that the standardization of pipe-threads cannot be confined to gas tubes and fittings, but that it must be considered in conjunction with pipes used for a vast number of other purposes, such as steam heating, hot-water heating, steam-piping, air-piping, cold-water piping, and so forth. As all these interests had been consulted by the British, German, and American delegates, the representatives of the Société Technique de l'Industrie du Gaz en France undertook before next convening the Conference to call together the larger French interests affected, and obtain their views prior to the next meeting of the Conference.

Extract from Comparative Table of British Standard and Proposed International Standard Pipe-Threads, October, 1910.

1	2	3	6	10	11	12	15
Nominal Bore.			Gauge Diam.	Pitch.			Length of Thread
British.		International.	International.	British.	International.		International.
In.	Mm.	Mm.	Mm.	Threads per Inch.	Threads per 100 mm.	Corresponding Threads per Inch.	M m.
$\frac{1}{8}$	3·17	3	9·8	28	110	27·94	9·5
$\frac{1}{4}$	6·35	6	13·2	19	71	18·03	11·0
$\frac{3}{8}$	9·52	10	16·8				12·5
$\frac{1}{2}$	12·70	13	21·0				14·0
* $\frac{5}{8}$	15·87	16	23·0	14	55	13·97	15 0
$\frac{3}{4}$	19·05	19	26·4				16·0
* $\frac{7}{8}$	22·22	22	30·2				17·0
1	25·40	25	33·0				18·0
*† $1\frac{1}{8}$	28·57	29	38·0				19·0
$1\frac{1}{4}$	31·75	32	42·0				20·0
$1\frac{3}{8}$	38·10	38	47·8				22·0
* $1\frac{1}{2}$	44·45	44	53·8				24·0
2	50·80	51	59·8				26·0
$2\frac{1}{4}$	57·15	57	65·8				28·0
*† $2\frac{3}{8}$	60·32	60	72·8	11	43·3	11	29·0
$2\frac{1}{2}$	63·50	63	75·2				30·0
* $2\frac{3}{4}$	69·85	70	81·6				32·0
3	76·20	76	88·4				34·0
* $3\frac{1}{8}$	82·55	83	94·0				36·0
$3\frac{1}{2}$	88·90	89	101·0				38·0
* $3\frac{7}{8}$	95·25	95	106·0				40·0
4	101·60	102	113·4				42·0

* Paris Congress suggests that for general use these sizes be dispensed with.
† Added at the Paris Congress, October, 1910.
‡ Outside British standard limits.

THE VOLATILE CONSTITUENTS OF COAL.

By Maurice J. Burgess and Richard V. Wheeler, D.Sc.

A summary was given in the "Journal" for Jan. 3, p. 25, of the results of an investigation into the nature of the volatile constituents of coal made by Messrs. Burgess and Wheeler in connection with the experiments which were being conducted at Altofts by the Coal Dust Committee appointed by the Mining Association of Great Britain. The results then given were quoted from a preliminary paper presented by Messrs. Burgess and Wheeler to the Chemical Society. A second paper by the same authors has now been published in the Journal of the Society, giving the results of further investigations which they have made. The following is a summary of the contents of the second paper.

The authors' preliminary set of investigations led them to the following provisional conclusions:—

(1) With all coals, whether bituminous, semi-bituminous, or anthracite, there is a well-defined decomposition point, at a temperature lying between 700° and 800° C., which corresponds with a marked increase in the quantity of hydrogen evolved. With bituminous coals, the increase in the quantity of hydrogen evolved falls off at temperatures above 900° C.; but with anthracite coals, it is maintained up to 1100° C.

(2) Evolution of hydrocarbons of the paraffin series ceases practically entirely at temperatures above 700° C.

(3) Ethane, propane, and butane, and probably higher members of the paraffin series, form a large percentage of the gases evolved at temperatures below 450° C.

The marked change in the composition of the gases which was observed at a temperature lying between 700° and 800° C., or perhaps 750° and 800°, is taken as evidence of a critical period in the decomposition of coal between these temperatures. The wide differences in composition of the gas, and the rapid fall in its rate of evolution after the first few minutes of heating when a high temperature is employed, have suggested to the authors that useful information might be obtained by examining the composition of the gases evolved during successive stages of distillation at a uniform temperature. The existence of compounds of different degrees of stability under the action of heat might thereby be recognized, and a further insight into the composition of coal would possibly be gained.

The authors quote from Butterfield's "Chemistry of Gas Manufacture" a statement as to the proportions, relatively to the total make, of the gas evolved at different periods in the carbonization of coal in ordinary gas-retorts, and the candle power of the gas so evolved at different periods. The statement shows that the greatest rate of evolution of gas corresponds with the greatest illuminating power, and a gas rich in hydrogen and poor in hydrocarbons is known to be of relatively low candle power. Analyses of the composition of coal gas as evolved in successive stages of manufacture point to a progressive increase in the percentage of hydrogen as distillation proceeds. These analyses, however, do not admit of a complete differentiation between the influence of time and of temperature, because the centre of the charge in an ordinary gas-retort does not acquire the temperature of the retort until some hours after its introduction, and the coal in contact with the hot walls of the retort consequently yields up practically all its gas much earlier. The gas from coal heated to a high temperature is, therefore, during carbonization in an ordinary retort mixed with the gas from coal heated to a relatively low temperature. The authors have devised an apparatus by which they collected separately the whole of the gases evolved at different stages in the heating of different samples of coal from the commencement until the cessation of the evolution of gas. They employed, as before, a small charge of 2 grammes of finely-powdered coal, and heated it in the electric resistance tube furnace described in their previous paper. It is pointed out that with this small charge no great interval of time elapses before all of it has attained the temperature of the retort.

It had already been shown that a compound exists in coal which decomposes rapidly at a temperature lying between 700° and 800° C., yielding hydrogen as its principal gaseous product. At lower temperatures, paraffin hydrocarbons, and not hydrogen, are the chief products. The results given in the present paper indicate that coal contains a compound of less stability to the action of heat, which yields paraffins as its gaseous decomposition products. The first gases evolved at temperatures either above or below the afore-mentioned critical period of decomposition consist in largest proportions of paraffin hydrocarbons; and at temperatures below the critical period not more than from 1 to 2 per cent. of the hydrogen is evolved during the first few seconds of heating. Coal, therefore, appears to contain two types of compound of different degrees of ease of decomposition. The more unstable compound yields paraffin hydrocarbons and not hydrogen, while that which is decomposed with greater difficulty yields hydrogen alone, or, possibly, hydrogen and the oxides of carbon. This view was confirmed by fractional distillation of some samples of coal in a vacuum. Prolonged exhaustion at a low temperature admits of the complete removal of the paraffin-yielding constituents; while a compound is left behind which, on decomposition at a high temperature, yields hydrogen. The difference between one coal and another may very probably be determined mainly by the proportion in which these two types of compound exist in it. The "coal substance" is probably compounded of the two types, the behaviour of which differs so greatly under the action of heat. There are traces of sulphur compounds and other material in the coal that mask the character of the "coal substance;" and for this reason the authors have omitted from the data recorded any special reference to variations in the quantities of ammonia, benzene, and unsaturated hydrocarbons evolved. The compounds from which these bodies are derived cannot, they consider, be rightly regarded as essential constituents of coal, as are the paraffin and hydrogen-yielding compounds. It is noted, however, that benzene and the ethylene hydrocarbons disappear rapidly from the products at high temperatures as distillation proceeds.

The variation that occurs in the quantity of carbon monoxide evolved must, however, be explained. It presumably arises from the decomposition or the interaction of oxygenated compounds in the coal. The quantity of carbon monoxide evolved increases with the temperature of distillation. The percentage of carbon monoxide in the gases, though not the absolute quantity, increases very markedly towards the end of distillation at a uniform temperature. Thus the rate of formation of carbon monoxide is uniform throughout the period of distillation at any one temperature, though the rate of evolution of other gases falls off as distillation proceeds. The formation of carbon monoxide, however, increases with increase in the temperature. Hence it may be concluded that the carbon monoxide results mainly from the interaction of oxygenated compounds with the carbon of the coal, and not from direct decomposition of these compounds. Probably it arises through elimination of water from hydroxy compounds, and subsequent reaction of the water vapour with the carbon.

The vegetable origin of coal suggests that cellulose derivatives must enter largely into its composition. There is strong presumptive evidence that micro-organisms have played an important part in the decay of the plant structures. Certain ferments are known to resolve cellulose and water into carbonic acid and methane, which gases are those most commonly met with in coal measures. Reviewing the different products of the decomposition of plant tissue, it is noticeable that the carbon gradually accumulates at the expense of hydrogen and oxygen, showing a tendency of cellulose, apart from the tendency to complete resolution already referred to, towards a condensation of the carbon nuclei to more complicated forms, with elimination of water.

Bedson points out that pyridine has a simple solvent action on part of the coal substance. Extracting coal No. 1 (Altofts Silkstone) in a soxhlet apparatus with pyridine, as much as 30 per cent. of a dark chocolate brown coloured extract was obtained. This extract yielded on destructive distillation a mixture of paraffin hydrocarbons and hydrogen, the proportion of hydrogen increasing with the temperature. The residue left on extraction was a black, porous coke-like mass, which on destructive distillation at 900° C. yielded chiefly hydrogen and oxides of carbon, as does pure cellulose. It would thus appear that there are two distinct types of compound in the coal substance; the most important one being a degradation product of cellulose. This the authors identify with the "hydrogen-yielding constituents" of coal disclosed by their experiments. They hesitate, however, to identify the paraffin-yielding constituent of coal with the matter extracted by pyridine, though their results favour this identity. Probably the paraffin-yielding constituents of coal are derived from the resins and gums originally contained in the sap of the coal plant, and form the "cement" of a conglomerate of which the cellulose derivatives are the base.

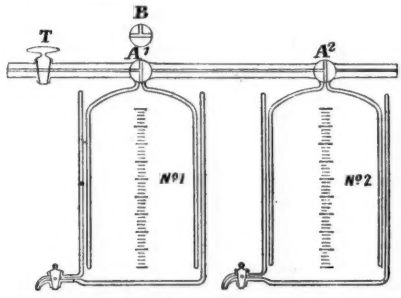


Fig. 1.—Arrangement of Gasholders for Collecting Samples during Successive Intervals of Time.

The coals on which the present investigations were made were those designated Nos. I., III., and IV. in the summary of the previous paper—viz., No. I., bituminous (Altofts Silkstone); No. III., semi-bituminous (Penrhycyber); and No. IV., anthracite (Pontyberen). The platinum retort furnace and distillation apparatus generally were the same as used in the previous set of investigations. The gases were collected in a series of ten small holders of 100 c.c. capacity connected by three-way taps, as shown in fig. 1, which represents the first two of the holders. By means of the taps, the stream of gas could be turned into one gasholder after another at a definite time. The gasholders and all connections on their side of the inlet tap T (fig. 1) were filled before commencing an experiment with a mixture of equal parts of

TABLE I.—*Composition and Volume of Gas Evolved at Different Periods in the Distillation of 2 Grammes of Bituminous Coal (Altofts Silkstone) at Different Temperatures.*

Distillation Temperature.	625° C.				950° C.					900° C.				
Minutes after start when collection of sample of gas was begun	2	2¼	2½	2¾	1	1¼	1½	1¾	2	1	2	3	9	24
Duration of collection of sample, seconds.	5	5	5	5	5	5	5	15	30	15	30	60	900	1800
Volume of sample of gas c.c.	2·5	2·5	2·5	2·5	16·05	30·20	32·10	70·70	56·60	55·0	70·5	22·0	50·2	13·5
Composition of sample, calculated as "nitrogen free":—														
Ammonia per cent.	1·00	3·80	5·20	2·75	..	..	..	..	..	..	..	.	..	..
Benzene ,,	9·25	9·45	7·65	7·55	9·45	6·60	2·45	0·20	0·20	13·10	0·85	0·35	0·20	1·30
Carbonic acid ,,	4·65	2·90	1·95	0·40	2·35	2·45	1·60	0·60	0·30	3·90	0·55	0·50	1·85	2·75
Acetylene ,,	0·25	0·70	1·00	0·85	1·45	0·85	0·55	0·30	nil	..	..	..	..	..
Ethylene ,,	2·65	3·35	1·55	1·05	6·85	4 65	1·35	0·20	0·10	4·70	nil	nil	0·40	0·25
Carbonic oxide ,,	8·80	8·40	6·80	9·25	12·60	12·40	11·75	10·00	8·85	9·50	9·70	7·40	21·75	32·15
Hydrogen ,,	3·60	3·35	2·60	nil	11·35	33·50	48·95	77·75	82·85	10·35	74·55	84·85	70·45	50·40
Methane ,,	42·90	43·10	56·00	61·85	44·55	31·05	28·50	10·10	7·70	46·00	18·45	6·90	5·05	13·25
Ethane ,,	26·85	24·85	17·15	16·30	11·40	8·45	5·05	0 80	nil	12·45	0·90	nil	0·30	nil
Volumes of principal constituents evolved: c.c. at 0° C. and 760 mm.:—														
Carbonic oxide	..	..	..	..	2·08	3·74	3·75	7·07	5·01	5·23	6·84	1·54	10·92	4·35
Hydrogen	..	..	..	..	1·82	10·12	15·70	54·96	46·90	5·70	52·55	18·84	35·37	6·81
Methane	..	..	..	..	7·15	9·38	9·15	7·14	4·35	25·32	9·48	1·53	2·54	1·79
Ethane	..	..	..	..	1·83	2·55	1·62	0·56	nil	6·85	0·63	nil	0·15	nil

glycerine and water. The carbonization of the 2-gramme sample of finely-divided coal was carried out exactly as in the previous set of investigations. The temperatures recorded are those of the retort, which, however, is reached by the coal itself about two minutes after the commencement of the test. Collection of the gases was begun one minute after the introduction into the retort, except in trials made at temperatures below 700° C., when two minutes were allowed to elapse before the collection of the gases was started. The results of three sets of experiments at different temperatures, all made with bituminous (Altofts) coal, are summarized in Table I. In the first set of experiments, at a distillation temperature of 625° C., the gases were collected during ten periods of five seconds each, commencing two minutes after insertion of the retort in the furnace. It will be seen that very little hydrogen was present in any of the fractions, and that none could be detected in the last. The gases consisted almost entirely of paraffins, of which methane increased at the expense of the higher members as distillation proceeded.

The second set of experiments was made at a distillation temperature of 950° C., and the first seven samples were collected during periods of five seconds each, the eighth sample during ten seconds, the ninth during fifteen seconds, and the tenth during thirty seconds. The figures show that the percentage of methane decreases progressively from the beginning, while that of hydrogen increases until in the last sample (2 to 2½ minutes from the insertion of the retort) the gases contained over 80 per cent. of hydrogen, but little methane, only traces of benzene and ethylene, and

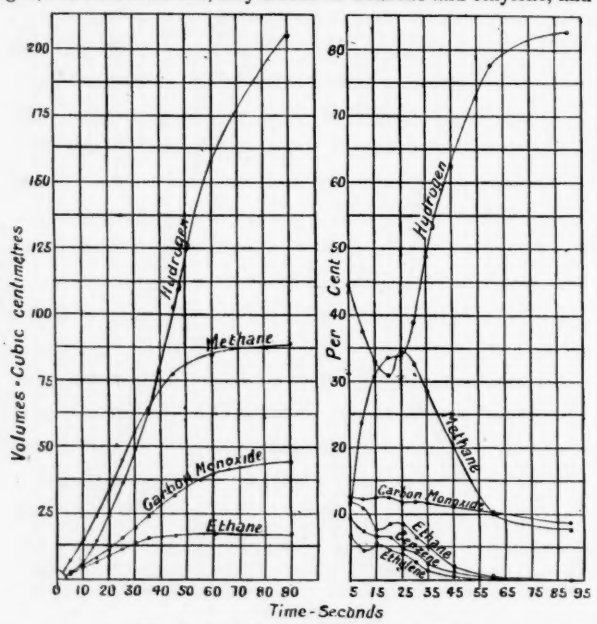


Fig. 2.—Coal No. 1: Distillation at 950°.

no ethane. The disappearance of benzene, ethylene, and ethane is interesting, because their presence is frequently supposed to determine the illuminating power of coal gas. The results obtained on distillation at 950° C. are also plotted in the diagrams given in fig. 2. The curves indicate clearly that paraffin hydrocarbons are primary gaseous decomposition products of the coal, whereas the chief part of the hydrogen is a secondary product. The rate of evolution of the carbon monoxide is fairly constant throughout.

The third set of experiments was made at a distillation temperature of 900° C., and differed from the second set in that the collection of the gases was extended over longer intervals of time, as appears from Table I. The proportion of carbon monoxide in the gases evolved increased rapidly after the lapse of eight minutes; but the actual quantity of that gas evolved in a given time did not increase. Evolution of gas from the coal practically ceased at the end of 23 minutes; but a mixture of hydrogen and carbon monoxide with some carbon dioxide continued to be produced from interaction between the steam and residual coke.

A second method of investigation was also employed—viz., the fractional distillation of a coal in a vacuum. The charge of 2 grammes of the dried and sifted coal, mixed (as before) with 3 grammes of ignited sand, was, in this second series of experiments, introduced into a bulb tube of Jena glass. The bulb was 16 mm. (0·6 inch) in internal diameter, and 12 cm. (4·7 inches) long, and the neck of the tube was 7·5 mm. (0·3 inch) and 19 cm. (7·5 inches) long. The charge of coal and sand rested evenly on the bottom of the bulb, occupying about half its volume. The neck was packed with ignited asbestos for a distance of about 4 cm. (1·6 inches), and the end connected by stout rubber pressure tubing to an automatic Sprengel mercury pump. The apparatus was thoroughly exhausted while cold, and the bulb was then heated in the electric resistance tube furnace to a temperature of 350° C., which was maintained for twenty-four hours—the exhaustion, and collection proceeding continuously. The temperature was afterwards increased by stages of 50° to 650° C.; being maintained constant at each stage for twenty-four hours. Notwithstanding that the coal used had been previously dried at 107° C., there was during distillation a deposition of water in the cold neck of the glass bulb tube, which water must have been water of constitution, most probably arising from the elimination of hydroxyl groups. Decomposition of the coal did not begin to take place till about 350° C., and the gases collected up to this point were merely the occluded gases of the coal. They contained high percentages of the oxides of carbon. Occluded gases are sometimes retained even at 150° C., so that the previous evacuation of the bulb tube at room temperature would not wholly remove them.

TABLE II.—*Volumes of Hydrogen and Saturated Hydrocarbons Evolved on Fractional Distillation in a Vacuum of 2 Grammes of Dry Coal.*

Gas Evolved.	Hydrogen.			Saturated Hydrocarbons.		
Type of Coal.	I.	III.	IV.	I.	III.	IV.
Limiting Temperature.	c.c.	c.c.	c.c.	c.c.	c.c.	c c.
15 to 350° C.	0·15	0·08	..	1·35	0·06	..
400°	2·40	..	0·11	9·85	..	0·23
450°	12·65	12·1	..	26·95	16·6	..
500°	24·10	..	5·7	25·10	..	5·92
550°	47·00	129·2	..	19·05	42·0	..
600°	68·65	89·2	82·6	14·50	9·95	19·70
650°	80·60	162·2	..	8·40	5·0	..

The essential differences in the amount and composition of the gas evolved in fractional distillation in a vacuum, with a rise of temperature of 50° C. every twenty-four hours, are shown for three types of coal in Table II., which gives the total volumes of hydrogen and saturated hydrocarbons evolved from 2 grammes of the dried coal. In the case of coals Nos. I. and III., the gases were completely extracted at each temperature in 12 to 24 hours; but in the case of the anthracite (No. IV.), continuous exhaustion for several days failed to remove the last traces of gas at each temperature. The high proportion of hydrogen and the low proportion of saturated hydrocarbons in the gases evolved at 650° C. are regarded by the authors as strong confirmatory evidence of the existence of the two types of compounds already referred to in the coal substance. The total volumes of hydrogen and saturated hydrocarbons obtained by the fractional distillation of coal No. I. have been plotted from Table II. on diagram fig. 3. The semi-

bituminous coal (No. III.) was distilled in the retort at a temperature of 950° C., and samples of gas collected during consecutive periods. The results obtained are shown graphically in fig. 4, a comparison of which with fig. 2, referring to bituminous coal (No. I.), shows that the semi-bituminous coal contains a larger proportion of the hydrogen-yielding constituents than does

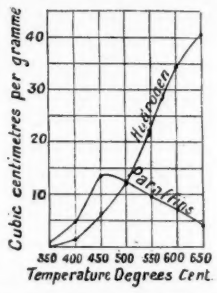


Fig. 3.—Coal No. 1: Fractional Distillation in a Vacuum.

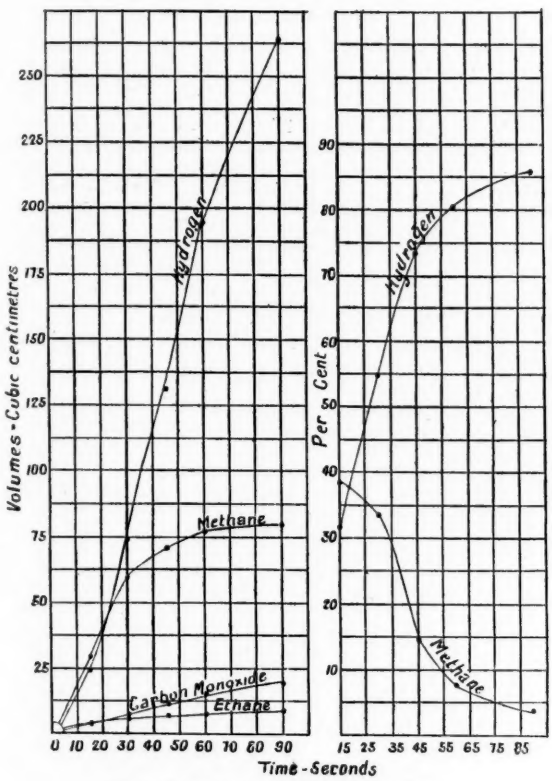


Fig. 4.—Coal No. 3: Distillation at 950°.

the bituminous coal. An idea of the relative amounts of the paraffin-yielding constituents can be obtained from a comparison of the total amounts of saturated hydrocarbons evolved from the two coals, as shown in Table II. The anthracite (No. IV.) was distilled at 900° C., and the gas evolved was collected during successive periods of the distillation. The results showed a smaller evolution of gas than in the case of the other two coals, with a relatively large proportion of hydrogen.

TABLE III.—*Comparative Yields of Paraffin from Different Samples of Bituminous Coal.*

Coal; Sample.	Total Volatile Matter. Per Cent. of Ash-free Dry Coal.	Paraffins evolved in a Vacuum up to 650°. C.c. per Gramme of Ash-free Dry Coal.
A	40·60	47·9
B	35·50	53·3
C	33·07	62·7
D	30·10	47·2

The authors point out that interesting variations in composition may be observed in comparing samples of coal of the same class. In Table III. are given the relative quantities of the paraffins evolved from four different samples of bituminous coal, and the percentage of total volatile matter in the coals. The table shows that one coal may contain a larger percentage of total volatile constituents than another, and yet not yield so great a quantity of paraffins. This points to it not containing so much of the readily decomposed constituents.

In conclusion, the authors remark that the ease with which inflammation is propagated in coal dust of the same degree of fineness appears to depend on the percentage of paraffin-yielding constituents in coal rather than on the total volatile constituents.

SAFETY VALVES FOR GAS-MAINS.

The following patented appliances of M. Picot should be of interest to gas manufacturers and consumers, as well as to insurance companies. They were described in one of the papers submitted to the recent meeting of the Société Technique du Gaz en France.

In fig. 1, the appliance entitled "Block-Gaz" is shown. It is 6½ cm. in length and 3 cm. diameter, and screws on to any main intended to supply a stove or radiator. Two valves of bronze, thinned at the edges, are suspended by double hinges working quite easily. The first valve opens into the interior of the apparatus; the second into the outside air. Both are fitted with counterweights, which cause the valves to remain open when not exposed to the pressure of the gas.

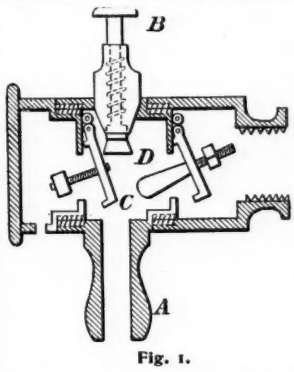
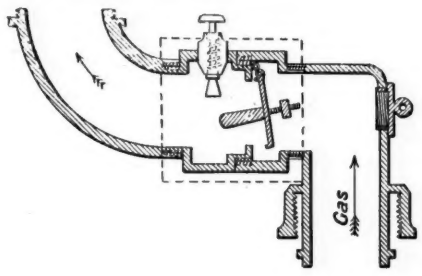


Fig. 1.

The action of the apparatus is very simple. It is connected to the gas-burners by the nozzle A and a rubber tube, and pressure is then applied on the piston B. The rod, by pressing on the counterweight of the valve, keeps the latter open. The gas enters the body of the apparatus, presses the valve C against its seat, and passes to the burners. Since the valve D remains open when there is no pressure, it retains this position when the pressures on either side are practically equal. But if the rubber tube is broken or if it becomes detached, reduction of pressure being produced below the valve D, the latter is held tight in place and prevents the passage of any gas.

The valve C, which opens to the outside air, commences to act when the gas supply stops for any reason, and is resumed some minutes later. As soon as pressure of gas ceases to act on its seat, it remains open, and air penetrates behind the valve D, which thus opposes the return of the gas. It has been necessary to insert this second valve since the counterpressure in the bunsen tube is not dissipated very quickly, and since, if the gas returns some minutes after stoppage, the light would be extinguished, but the first valve would remain open. Admission of air behind the first valve, of course, contributes to this drawback.



The second device, based on the same principle, is constructed with only one valve. It screws on to the outlet union of a meter; and the passage of the gas may be regulated, as required by the town-pressure, by means of the counterweight fixed on the valve. In order to put the apparatus in action, the piston is pressed down when the gas passes under the valve. Pressure being practically equal, the valve remains open; but if a reduction of pressure takes place below, the pressure instantly checks the valve. This device is said to have many advantages for gas companies, as it prevents the consumer from obtaining a greater supply through his meter than he should do. In case of fire, if one of the mains should give way, a check to the gas is instantly produced without it being necessary to close the meter.

Two further small pieces of apparatus have been patented by M. Picot. They are 2 cm. in height by 1 cm. diameter, and are designed one for use under an upright burner and the other over an inverted burner. If the meter is closed without closing the key of the apparatus on which the burner is screwed, on opening the meter again the gas will not pass except by pressure of a small piston which raises the valve. This valve is of very light construction (producing no loss of pressure) and works in a groove, which is slightly conical at the base. It is fixed on a thin rod; and on the gas-supply being stopped, the valve rests on the conical part, and is then exposed to the pressure of the gas only over the surface of its rod, which has an area of only 0·5 sq. mm. Thus on raising the valve by a piston of the "Block-Gaz" type above described, the gas passes through the opening of the rod and raises the valve.

Ozonization of water has been introduced at Hermannstadt, Hungary, where a series of typhoid epidemics have occurred. Siemens ozone batteries and De Frise sterilizing towers are both being used.

AUTOMATIC AND CONTROL DISTANCE-LIGHTING OF GAS-BURNERS.

A number of short papers read before the Congress of the Société Technique du Gaz en France had for their subjects the methods of lighting and extinguishing burners from a central station. M. Cabrier described two designs of valves for lighting by pneumatic control over areas of even and differing pressures respectively; M. Laforgue presented one note on the Couaillet lighter for gas and electric lamps, and another on the Grimmeisen lighter for street-lamps; while M. de la Boulaye communicated some notes as to the behaviour of various lighting methods in practice. The following are translations of these papers.

M. CABRIER'S PAPER.

The author dealt with the lighting and extinguishing of lamps at a distance by means of a bye-pass burner. For the control, from a distance, of a given number of burners, a single cock is used—for example, that of the meter. It is provided with a small slot, so that when turned off it does not completely cut off the supply of gas, but leaves the bye-pass flames with a sufficient supply. Each of the bye-pass flames will burn under a pressure which is made as low as possible—say, 8 mm.—and there is then fitted to each of the burners some device which will allow the passage of gas only above this pressure.

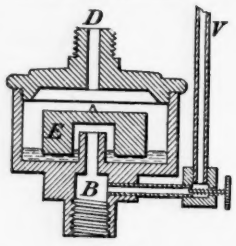


Fig. 1.

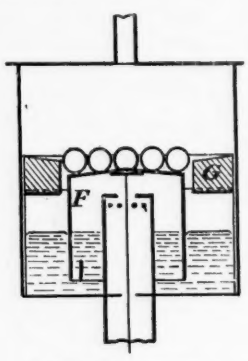
The device shown in fig. 1 allows of this being done on any description of burner. It consists of a cylindrical box, provided with an inlet pipe B for the gas prolonged for a short distance inside. The cover of the box is fitted with a central tube D for the outlet of the gas. The box contains a very shallow layer of mercury, on which rests the floating valve E, formed of wood or metal, and cut out so as to cover the central inlet tube. This valve intercepts the passage of the gas as long as the latter does not attain the pressure capable of raising the valve. When this pressure is reached—that is, when the control cock is opened—the gas slightly raises the valve, flows under it, and escapes freely by the upper tube D. The gas will thus be ignited by the bye-pass flame V (which latter may be arranged so as to be extinguished during the period of lighting).

Under this arrangement, all the burners of any given installation will be lighted on turning the control cock; but when the latter is closed, the pressure becomes too feeble and is only able to support the bye-pass flame, so that the main supply is cut off.

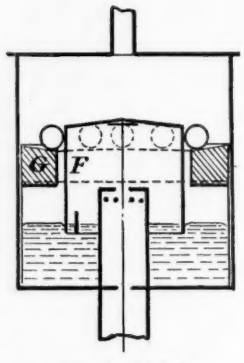
In applying this system to outdoor lighting, it suffices to adjust the weight of the valve so that it can rise only under a pressure greater than that which prevails in the system during the period of extinction. In practice, the proper action of the apparatus requires a difference of at least 15 mm. between the maximum pressure during the period of extinction and the minimum during the period of lighting. The adjustment of the apparatus, however, on outdoor lamps requires to be made once and for all when fitting up the system. For this, the time will be chosen when the day pressure is at its maximum; and there is placed on the valve, if it is too light to intercept the passage of gas, one or two metallic washers. This ensures that the street burners will light only when the requisite pressure is supplied by the works, and will be extinguished only at the moment of reducing the pressure at the conclusion of the period of lighting.

The lighting and extinguishing device first described evidently does not fulfil all the requirements of practice, and can only be used on parts of the system where it is certain that the night pressure will be at least 15 mm. greater than that during the day. Where this is not the case, the difficulty may be overcome by providing an obstacle to the passage of the gas, the weight of which varies automatically—that is to say, requires a greater pressure to raise it than that necessary to maintain the light.

This calls for a somewhat more complex construction. A bell F (figs. 2 and 3), guided by a central rod, covers the inlet tube of the gas, and (as in the previous device) rests over a small mercury bath into which its weight causes it to dip. The cover of the bell is made slightly conical, and carries several balls so arranged that they automatically reduce the weight of the bell at the required moment. The bell is able to move, with a certain amount of play, in the space provided by the annular chamber G. The balls escape from the cover of the bell when the level of this latter is raised (under the pressure of the gas), above that of the annular chamber. The top surface of the chamber is made inclined towards the bell, so that on the latter falling again (on a reduction of the pressure of the gas), the balls roll back on to the cover of the bell. Thus, on the gas pressure being increased at the works, the bell, on rising, is relieved of part of its weight and continues to rise. It will be kept at a level at which the gas escapes freely through the slit in its lower part.



Position for Extinction.
Fig. 2.



Position for Lighting.
Fig. 3.

Extinction of the burners takes place the opposite way. On the works' pressure being reduced to a degree sufficient to allow the bell to fall of itself, the latter reaches the point at which the balls roll back on to the cover, giving it the increase in weight until the next operation of lighting.

The difference between the excess pressure necessary for lighting and the low pressure required for extinction should be sufficient, the author states, to allow of the system being conveniently applied to the majority of districts served by mains.

M. LAFORGUE'S PAPER.

In a short note read before the Congress, M. Laforgue gave a description of the Gunning-Couaillet automatic lighter and extinguisher for both gas and electric lamps.

The apparatus includes clockwork mechanism actuating a movable dial which rotates once in 24 hours. On the edges of this dial two hands, marked AL and EX (lighting and extinguishing), are able to slide. A commutator in the form of a St. Andrew cross is fitted with insulating packing and with contacts working by spring pistons. The hands AL and EX, as also the dial, are mounted loose on the central axis of the clockwork, and are caused to turn with the axis by simply screwing the key-nut, which serves at the same time to rewind the apparatus. The commutator (figs. 4 and 5) is subjected to the rotation of the hands by means of a

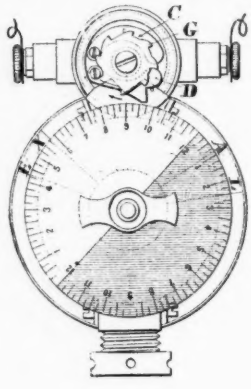


Fig. 4.

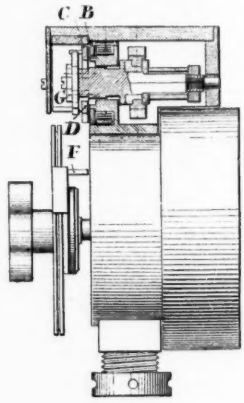


Fig. 5.

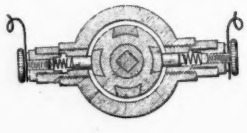


Fig. 6.

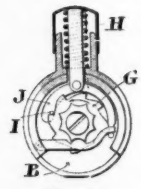


Fig. 7.

spring drum, the movable plate B of which carries two pawls C D. The lower pawl is subjected to the successive action of needles fitted for this purpose with a hook or catch F; the spring of the drum being thus stretched at lighting and extinguishing. The upper pawl gears with the detent of the spring, engaging through the dowel and, by a rapid movement, with the ratchet wheel G, which forms part of the axis of the commutator.

This latter (set in movement by this means) makes or breaks the circuit according as lighting or extinction is required—the positions of the commutator being regulated by a brake, controlled

by the drum (fig. 7). Hand-lighting may be done—outside the scheduled hours, and without upsetting the dial or the hands of the apparatus—by means of a spring button H, the action of which is communicated to the commutator by the ratchet G and the connecting pieces I J. It will thus be seen that the lighters for electric lamps have the same advantages as those for gas-burners and differ only in the replacement of the cock in the gas-lighter by the commutator described, when the apparatus is applied to the electric light. Both types of apparatus are not exposed, being placed in a completely closed bronze case. That for gas-burners is placed inside the lantern, the cross-work of which does not require alteration. Inspection is quite simple, owing to the special form of union which is fitted. This allows of the apparatus being moved about without unscrewing, while in the case of gas it remains perfectly tight. Lastly, the apparatus is very small, yet strong. The clockwork is constructed to go for fifteen days without rewinding. All the adjustment required to regulate the apparatus is simply done, and the single screwing of a key-nut locks the whole system, which cannot then be tampered with.

It may be mentioned, in conclusion, that the Couaillet apparatus for gas-burners has already been installed to the number of 60,000 in England as in France.

M. Laforgue (in a short note) also described the system of Messrs. Ch. & G. Grimmeisen of lighting by means of a single three-way cock in conjunction with a bent lighting tube. The use of one cock only avoids the double union which the author points out in other types of apparatus often gives rise to trouble. In fig. 8, A is the cock, the control lever B of which rests on the flap C. For lighting, the torch is used to raise the flap, which actuates the lever of the cock. This latter simultaneously admits

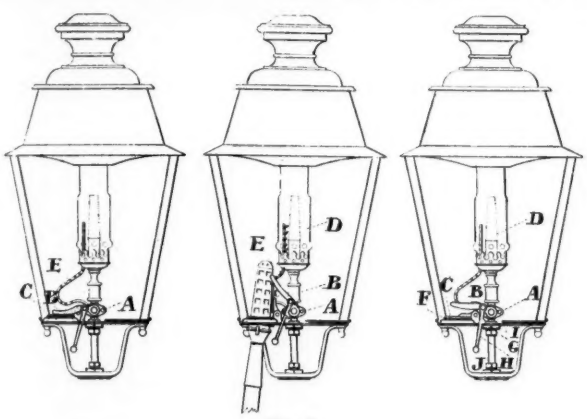


Fig. 8.

gas to the burner and to the climbing tube E. The latter inflames in contact with the torch and lights the burner. On withdrawing the torch, the flap falls back on its seat, detaching the lever of the cock, which descends again under the action of the spring. The cock closes the tube E, but is stopped by the notch of the handle H, which rests on the base of the burner, leaving the inlet of the gas to the burner open. To extinguish the burner, all that is necessary is to free the handle H by acting on the horizontal lever J. The apparatus has the advantage of allowing an ordinary spirit gas lighter to be employed. The spring of the cock is placed in a hermetically sealed box charged with grease—thus preventing oxidation of the spring and keeping the cock well lubricated.

M. DE LA BOULAYE'S PAPER.

The paper by M. de la Boulaye took the form of a general review of automatic lighters which had come within the author's experience. The author classifies lighters, first, into those suitable for indoor lighting and, secondly, those for street-lamps—the lighters in this second class being further subdivided according as they are actuated by clockwork or by pneumatic pressure. The following is the substance of M. Boulaye's notes on these several types of apparatus.

Of the lighters for indoor lamps, the "Konus" is worthy of note, since, despite its defects, it has two distinct advantages—it is very moderate in price and calls for no special installation. Using it for indoor lighting, and taking the precaution to turn on the bunsen flame from time to time, it acts very satisfactorily, but does not permit of lighting from a distance.

The "Goté" lighter works by means of dry batteries. The current from the battery passes through an interrupter, round an electro-magnet, along a fine platinum wire, and then back to the battery. Pressure upon the interrupter causes the current to flow, and the electro-magnet then raises the valve of the apparatus. The gas passes to the burner and to the bye-pass, the jet of which is directed on to the platinum wire. As the result of the tiny stream of gas, the wire (already heated by the current) is raised to redness, and ignites the bye-pass jet, by which in turn the burner is lighted. On releasing pressure on the interrupter, the bye-pass flame is extinguished; the burner remaining lighted. A second pressure on the interrupter puts out the light. The apparatus, which can be applied equally to inverted burners, is said to have several advantages. It is very simply attached and manipulated; is small in size, and is inconspicuous; while the bye-pass flame is not in action when the burner is lighted. But the price is somewhat high, and the battery requires constant attention. Some of those already installed have worked regularly, others badly or not at all. Nevertheless the author regards the Goté as one of the best types of electric lighter which he has tried; but, like all such electric devices, success depends on the generation of the current.

A pneumatic lighter made by Herr Weinmann, of Zurich, may be used for both upright and inverted burners. It is only mentioned in passing, as it was dealt with at the Congresses of 1905 and 1907. These lighters are absolutely proof against derangement, and work with great certainty; those supplied by the English agents have the advantage over the Swiss form of being fitted with an attachment which allows of the burner being used in the rare cases when the apparatus itself will not work.

These appliances all require a bye-pass flame; but they are fairly cheap and call for no expense as regards maintenance. By taking advantage of them, the author has recently been able to fit a large shop basement with gas-burners where it was necessary to supply intermittent lighting.

Lighting from a distance in indoor rooms appears to the author to be solved by the pneumatic method in cases where the customer is agreeable to a bye-pass flame. Many, however, object to the consumption of gas by a bye-pass, and the engineer must then have recourse to electric ignition, the irregularity of which is always to be feared. Moreover, such a method emphasizes to the customer the chief inferiority of gas compared with electricity, and may possibly suggest to him the adoption of this latter method of lighting.

In regard to systems for lighting street-lamps, and considering first those working by clockwork, the author says he has tested three systems, all of which require a bye-pass flame which is extinguished when the lamp is lighted. These are the Couaillet, the Kilchmann-Gaulis, and the Ménagé.

The "Couaillet" is of quite small size (practically invisible at night) and avoids cast shadows. He has had it in use for a year without having observed any cases of breakdown. But the apparatus calls for criticism in one or two points. Lighting and extinction, although much more rapid than with the former Gunning lighter, still take two or three minutes. Rewinding is done by the key, which likewise fixes the dial and the two fingers indicating lighting and extinction. Rewinding, setting to the time, and changing the times of lighting are thus one operation; and in adjusting any one of the three items, it is necessary to verify the time and the position of the index-fingers. The former apparatus did not possess these adjustments for hand working. The new model includes a bye-pass with lever tap for direct lighting.

In the "Kilchmann-Gaulis" apparatus, a dial, divided into 24 hours and actuated by clockwork, carries two index-fingers, which are fixed on the dial each by a screw. The first raises the valve which allows access of the gas to the burner and closes the bye-pass; a special arrangement holding this valve raised until the movement of the second index, which extinguishes the burner and opens the bye-pass. Rewinding is done, as for a clock, with a special key. An accessory device allows of the valve being opened or closed from the ground-level with a pole in the event of the clockwork stopping. Several of these appliances have been in use for eighteen months, and have to the present given every satisfaction. It is true they are rather bulky and costly; but for about a year past the makers have been engaged upon a smaller apparatus and have further perfected the valve, which is now formed from two balls, and contains no frictional parts.

In the "Ménagé" lighter, again, there is a dial actuated by clockwork. Two moveable sectors around the axis of the dial are of a radius somewhat greater than it. They are fixed on the dial by means of pressure-screws in such a way as to augment the projection of the dial during the period of the 24 hours corresponding with the burner being out. A lever rests on one side of the dial and supports at the other end a piece of cast iron, which dips into mercury. On the rotation of the dial bringing the sectors under the lever, the latter is raised, the piece of cast iron sinks, and causes a rise in the level of the mercury, which thus partly closes the aperture leading to the burner. On continuing the rotation, the sectors detach themselves from the lever, and it falls; the cast iron rising again under the pressure of the mercury, which thus opens up the inlet of the gas to the burner.

These lighters have been in use for too short a time for the author to be able to speak definitely of them; but so far as regards extinctions of the bye-passes, they have worked regularly. The workman entrusted with their maintenance and adjustment, however, considers them less easy to adjust than those on the two preceding systems.

As with the "Couaillet" apparatus, re-winding is done with the dial, which has to be again set to the time, and the apparatus is not so nice in appearance, as it is not fitted in the axis of the burner. The mercury in it renders it somewhat delicate to manipulate; but it is free from the drawback of the tap and valve, and thus prevents the smallest chance of leakage or seizing. It is fitted with a bye-pass allowing of lighting from the ground level in the event of the clockwork stopping.

The "Securitas" lighter is one which has quite recently been introduced. The author has not yet tested it, but simply states the principle of its working, which is somewhat different from that of the three preceding. It is an ordinary clock with the usual two hands indicating minutes and hours and two moveable index fingers, fixing the lighting and extinction by a method similar to that of a

pendulum clock. In his judgment, the apparatus is much easier to regulate than any of the preceding; the time being set to a minute with scarcely any difficulty, and the times of lighting and extinction varying by indivisible fractions of exactly five minutes. The index-fingers are moved on a plate on which are engraved 288 divisions for the 24 hours—that is to say, moving the finger from one division to another gives a difference of exactly five minutes. The absence of a rotating dial, which is a feature of most clockwork lighters, is a well-conceived idea, which should be confirmed in practice. But it should be added that the lighters are somewhat bulky and expensive.

Coming now to the lighters which work by pneumatic pressure, experiments were made in 1907, at Angers, with the Bamag pressure-impulse lighter; but it was found necessary to make these impulses equal to at least 25 mm. Since then the author has tried the pressure lighters of Kilchmann and Gaulis, which are much more sensitive; the pressure-impulse have only to disengage a spring which produces the force required for raising the valve. By means of shot, the burner may be regulated so that it will not act below a given pressure; and a pressure 7 to 8 mm. above this latter suffices to work the apparatus. The pressure-impulse to be given at the works need not thus exceed about 15 mm. These lighters have behaved well, especially where naphthalene was not liable to choke a main and interfere with the pressure-impulse. The system is evidently one with great attractions for the gas engineer. Since it allows of simultaneous lighting of all burners at fixed times, it does not call for any auxiliary system of mains, nor for the winding and adjustment necessary when using clockwork. Four re-winding operations per annum are sufficient. On the other hand, the impulses of pressure which are necessary involve certain drawbacks which are too well known for it to be required to recapitulate them. At periods of high consumption (November and December), the action was less regular, and then they have had to put the trials on one side.

Reviewing the various types of apparatus, the author's conclusion is that those working by clockwork are obviously designed and based on a principle which at first sight would appear to solve the problem. The actions of opening and closing the supply of gas to the burner at certain fixed times suggests the adoption of a clockwork mechanism; but special supervision is required for the maintenance and adjustment of these devices, all of which work independently and cannot be made to act simultaneously.

The lighters which depend on variation of pressure along the mains themselves are, as has been said, much more attractive; but whether a system of excess pressure or pressure-difference be used, it is always found that the following problem presents itself for solution: "To obtain the effect desired by the smallest possible variation of pressure without any accidental variation of the same degree being able to act on the mechanism at other times." Particularly in towns where the pressure is subject to variation, it is difficult to make the control of pressure sufficiently regular to avoid extinctions and lightings outside scheduled periods.

There still remains the method of control lighting by a central electric installation, or by an electric device operated by difference of pressure. M. Aubert, at the Congress last year, mentioned an interesting example; but such methods involve a separate system of connections, the cost of which is considerable. Economy is effected in the up-keep of bye-pass flames; but against this is the maintenance of the auxiliary system and electrical material.

The author, in conclusion, says we are not yet in possession of the perfect distance lighter; but it is possible that the problem will be solved by the more general use of gas supplied at extra pressure. Increase of pressure, as a result of employing a compressor at the time of lighting, could be used in order to operate a device for opening the gas supply to the burner, which would then be lighted from a bye-pass. Inversely, the removal of the compressor would produce extinction. One would thus obtain automatic and simultaneous lighting of all burners on a given system supplied with gas at excess pressure and without maintenance charges other than those inherent to a pressed-gas installation. This is doubtless the solution of the future, should this method of lighting grow to the degree one may legitimately predict for it.

The Testing of Creosote.—In the "JOURNAL" for the 16th ult. (p. 455), an abstract was given of a paper on this subject presented last month to the London Section of the Society of Chemical Industry by Mr. C. Edward Sage, F.I.C., with some notes of the remarks to which it gave rise. Those of our readers who are specially interested in the matter will find the text of the paper, and a full report of the discussion, in the "Journal" of the Society for the 31st ult.

Artificial Silk for Making Incandescent Mantles.—In the "Chemiker Zeitung," Herr E. Müller deals with the use of silk in the manufacture of incandescent mantles. In an abstract of his article which appears in the current number of the "Journal of the Society of Chemical Industry," it is stated that microphotographs of the threads of mantles of cotton, ramie, and artificial silk (Degea silk) taken after the mantles had been burned for 250 and 1000 hours, show that in the case of the artificial silk the separate fibres are still quite distinct, whereas cotton and ramie fibres show marked signs of alteration. Artificial silk mantles are characterized by the elasticity and toughness of their fibres, and, owing to their durability, are particularly suitable for street-lamps. Their lighting capacity is stated to be fully equal to that of ramie mantles.

CARBURETTED WATER GAS.

A paper was read before the London and Southern District Junior Gas Association on the 12th ult., by Mr. F. C. BRIGGS, of the Gaslight and Coke Company, entitled "Carburetted Water Gas." The following are extracts from the paper, which there was not time at the meeting to discuss. There were a number of lantern slides to illustrate the paper.

After explaining the nature and properties of carburetted water gas, the author described the plant of Messrs. Humphreys and Glasgow, and dealt with the twin-generator system. In the latter system, he said, there are two generators placed side by side, and connected to one carburettor and superheater. In blowing, the two generators are in parallel—*i.e.*, the blast enters the bottom of each. But on the run, when gas making, they are, for the greater part of the time, in series—that is, the steam is sprayed into the bottom of one, and the water gas travels up it, and down the other before reaching the carburettor. The object of this is to realize more clearly in practice the different conditions required in blowing and gas making. In gas making, it is essential to have a deep bed of fuel to reduce the carbon dioxide to carbon monoxide. In blowing, just the reverse is required—a shallow bed. The object here is to raise the temperature of the generator as quickly as possible; and therefore we require to form as much carbon dioxide, and as little carbon monoxide, as possible. For this reason, 1 lb. of carbon, in burning to CO, will liberate 4327 B.Th.U., but on burning to CO_2, it will liberate 14,500 B.Th.U. But if this CO_2 passing up through the upper layers of incandescent coke is reduced to CO, the heat generated is absorbed again, and consequently the fire is cooled. We therefore want our fuel bed as shallow as possible in blowing, to obviate this reduction. The practical limits to this condition ensure our producing sufficient CO to assist us to maintain the temperature in the carburettor. The twin generator thus realizes more closely than the single generator these theoretical conditions; for when blowing in parallel we have a comparatively shallow bed, and when running in series we have the deep bed of fuel.

This, the author said, is borne out in practice, for a great saving in fuel is effected—about 4 or 5 lbs. of coke used in the generator per 1000 cubic feet of gas made. There is also a further advantage due to the shorter time in which the heat of the generator is raised. It is found possible to work a five-minutes' run, and a minute-and-a-half blow, giving a three minutes' blow immediately after coking, though, of course, part of this three minutes is taken up in coking. Allowing for coking every five makes, we have, with this arrangement, 73 per cent. of the time used for gas making; whereas with the most usual arrangement with single generators—viz., three minutes blow and five minutes make—gas-making occupies only 62·5 per cent, of the total time.

Particulars followed as to the manipulation of the valves, the method of laying the carburettor and superheater bricks, the arrangement of oil-sprays, steam-sprays, and gauges, and the operating of the plant. On the latter point, he said, for the oil to be cracked into permanent gases, it must be in contact with the chequerwork at the required temperature for a certain definite time. If the time is extended unduly, the oil gas is burned, and carbon is deposited. If the time is curtailed, the oil is not properly cracked, and consequently condenses in the subsequent plant and mains. So that the rate of flow of the gas must be so arranged that the contact time of the oil gas is just that required, and no more. But, again, the rate of flow in the carburettor is controlled by that in the generator. If this is too great, it will lead to a large percentage of carbon dioxide being formed. The setting must, of course, be properly designed. But given this properly designed setting, the common rate of flow which is best for both generator and carburettor must be determined in practice, and rigidly adhered to. The amount of CO_2 allowed in the carburetted water gas determines very largely the output of the plant, because the larger the percentage of CO_2 that we allow in the gas, within reasonable limits, the greater can be the rate of flow, and consequently the volume of gas made. The rate of flow being increased, the heats of the carburettor and superheater must be raised to compensate for the shorter contact-time of the oil gas.

Almost the whole education of the gas maker, and the great secret of success, is the maintenance of the proper temperatures in different parts of the set. If the generator is allowed to become cool, the percentage of carbon dioxide will increase. If the carburettor and superheater are too cool, the oil will not be properly "cracked;" if too hot, the oil will be burned. It requires a large amount of experience to tell by appearances if the best temperatures are being used. But the following is a very good guide: In the gas take-off pipe, a short piece of (say) ¾-inch or ½-inch pipe is fixed, provided with a small cock. On the run, the cock is opened, and a piece of white paper held 2 or 3 inches from it in the issuing stream of gas. If after a few minutes the paper is charred, and cracks when bent, the carburettor or superheater is too hot; if a wet and oily stain is obtained, the set is not hot enough. When the set is at the proper temperature, the paper will be stained a dark brown, it will be quite dry, and will not crack when bent. To maintain a good fire in the generator, it is essential that the coke should be, within reasonable limits, all of one size—not too small, free from breeze, and dry. If it contains a large proportion of small coke, the fire becomes dead in the centre, the efficiency

of the set is lessened, and the generator linings will more quickly burn away.

Most gas makers who take an intelligent interest in their work have little tricks and ideas of their own for the better maintenance of the heats, and working of the set. One or two may be mentioned. However well the set is manipulated, the heat of the carburettor is certain to fall somewhat immediately after coking, and to be at its hottest immediately before coking. So that some gas makers, though keeping the correct average number of gallons of oil per run, will put in a little more than the proper amount the run before coking, and a little less the run after. If working 14 gallons per run, perhaps 16 gallons will be used before, and 12 gallons after coking.

At the end of the run, immediately before the generator has to be coked, the set is pulled up in the usual way, the generator blast is immediately closed again, the generator coked as quickly as possible, and the blow completed. So that the time taken for coking, which may be 1 to 1½ minutes, is lost on the "blow" time. Therefore, when the fire is coldest the blow is curtailed to the extent of 50 per cent. or more. When running on an even make—*i.e.*, when the same number of minutes for each blow and the same number of minutes for each run are allowed throughout—the intelligent gas maker will here again tend to equalize matters. He will make the blow before coking one minute less than that booked on the sheet, and allow this minute upon the blow after coking.

Upon some plants this is taken into account, and, instead of a constant time for blowing being recorded (different times being worked), the time of blowing is varied, and recorded so. Thus, four minutes are allowed for the blow immediately after coking (the time taken for coking being included in this, as no interval is allowed), three minutes each for the next two, and two minutes each for the following two, when the generator is again coked. With this system, 64·1 per cent. of the total time is occupied by gas making, as against 62·5 per cent. with the usual three and five minutes system.

Even though the gas maker does depart from the system already mentioned for the better working of the set, yet the system is indispensable, and chaos would result without it. But it certainly seems advisable to modify the system so that what is recorded upon the sheets is as nearly as possible what actually takes place upon the plant. Therefore the variable blow that I have mentioned seems commendable.

What may be termed the pitfalls that await the gasmaker are explosion, excess of carbon dioxide, and excess of nitrogen in the gas. Before the introduction of locking gear on the plant, the chief danger points as to explosion were the blast-valves of the carburettor and superheater. When on the run, there is a large amount of inflammable gas passing through the plant at a high temperature—roughly, 1300° Fahr. If the carburettor or superheater blast were opened at this period, admitting a large volume of air, the result could be better imagined than described. A locking gear arrangement is now fitted to the plant, which, among other actions, prevents these two blast-valves being opened until the stack-valve is opened, and does not allow the latter to be closed while either or both of the former are still open. There exists one danger, however, which is not guarded against by the locking gear. The pressure in the generator is generally below 20 inches of water, and the blast pressure is usually at least 20 inches, and, further, the steam is turned off before the generator blast is turned on to scavenge the set; so that in this case no danger exists. But if a partial blockage takes place, causing the generator pressure to rise above the blast pressure, or if the blast pressure falls from some cause below that in the generator, and the generator blast is opened before the steam is shut off, which is often done, the gas in the generator, being at a higher pressure than the blast, will pass into the blast main, and a bad explosion will almost inevitably result. Therefore the blast pressure-gauge, which is usually fixed at a distance from the plant, is of primary importance.

An increase in the percentage of carbon dioxide may be caused in many ways. The most prevalent causes are dull fires, wet coke, an increased rate of flow, and leaky valves, either hot gas or steam. For the formation of carbon monoxide by the action of steam upon coke, a temperature of over 1800° Fahr. is required; while carbon dioxide is formed at a temperature of 1100° Fahr. In both reactions heat is absorbed, but a greater quantity when carbon monoxide is the ultimate product. If the fire is dull at the commencement of gas making, we have not only a low initial temperature, but a smaller quantity of heat stored in the coke and the lining of the generator to replace that absorbed by the reactions and so maintain the temperature required for the formation of carbon monoxide. Therefore a larger proportion of carbon dioxide is formed. A dull fire may be caused by, among other things, bad clinkering, a leaking steam cock allowing steam to pass the whole time, or by wet coke. The remedy for the first two is obvious. With wet coke it is very difficult to obtain a good fire. The only remedy, if the coke must be used, is to increase the length of the blow. If neither a dull fire nor wet coke is the cause, something may be learned from a study of the amount of gas being made. If this has increased considerably, other things being equal, the rate of flow—*i.e.*, the rate of admission of steam—will have increased. The importance of this has been already pointed out. The remedy is to turn the steam-valve off a little. This is not, of course, the valve manipulated by the the gas maker from the stage, but a controlling valve before that. The leakage of either of the valves on the down-run connection-pipe, owing to injury, or to the improper gearing of the two together preventing one closing, will probably lead to an increase in the percentage of carbon dioxide. If the bottom valve leaks, then on an up-run it forms a bye-pass between the bottom of the generator and the carburettor, allowing some of the carbon dioxide first formed at the bottom of the fire to pass straight to the carburettor, without passing through the upper bed of coke. Similarly, if the top valve leaks on a down-run, carbon dioxide may be bye-passed.

The last illustration was of a wet "flyers" catcher. The arrangement of which this was a photograph was, he believed, the only one fixed in London, and the first of the type erected in this country. When the blow is on, a large amount of very fine breeze and dust is blown out at the stack, which, if the plant has near neighbours, is, of course, very objectionable. The plant upon which this catcher is fixed is within a few yards of a paint and varnish works; and it is essential therefore that all the flyers should be stopped. Instead of there being the usual cone or dry flyers catcher fixed upon the top of the blast-gas exit-pipe through the roof, there is a bend. This is connected to a sectional cast-iron pipe. The lower end of the pipe is connected to a rectangular wrought-iron tank, which is provided with a short exit-pipe for the blast gas. Inside the cast-iron pipe there are thirteen water sprays each side—the first three pairs at the top spraying down the pipe, and the rest up. Upon the water supply to these sprays there is a cock, connected by a lever to the stack-valve lever in such a way that, when the stack-valve is opened, the water is turned on, and *vice versâ*. The flyers are completely interrupted, and washed down into the tank. The blast-gas leaves by the exit-pipe, and the water and flyers flow to a separating tank in the ground. The water flows away, and the flyers are regularly scooped out. The pipes, which are now cast iron, were at one time made of wrought-iron plate of about 10 gauge, but were found to last only some six to eight months. The present pipe was fixed about two years ago, and is still apparently in good condition, except one section, which has cracked.

Discussion.

The PRESIDENT (Mr. L. F. Tooth, at the annual meeting of the Association last Friday, invited discussion on the paper.

Mr. J. G. CLARK (London) asked the author if he had ever determined the heat-balance in carburetted water-gas plant. They got heat out of the generator in the form of carburetted water gas; and what proportion did this bear, roughly, to the heat contained in the original fuel—that was, the coke and the oil? If the author had made any comparisons on this basis, it would be interesting to hear about them.

Mr. E. G. STEWART (Kensal Green), referring to Mr. Clark's question, said that he had found something interesting in calculating up things in this connection. It was possible, if one knew the plant, to calculate the calorific value of the carburetted water gas. It was arrived at by taking the gallons of oil per 1000 cubic feet of gas made. Then by working the thing out two or three times, they would arrive at a factor, usually in the region of 100. Multiplying the oil per 1000 cubic feet (say, 2 gallons) by 100, they arrived at 200, to which they could add 300, the calorific value of the blue gas. This would give 500 B.Th.U. gross as the value of the carburetted water gas. The figure of 100, of course, depended entirely upon the oil. If a plant was taken over three or four months' previous working, a factor could be arrived at which would work with the same oil for a long while. On most carburetted water-gas plants, the difference between gross and net was about 40 B.Th.U. The flow of steam could be regulated exactly with a steam meter. It did not then matter whether the pressure was up or down, they always got the same amount of steam. Did he use anything like flaps over the stack to stop the burning away of the brickwork during clinkering? What was the average life of the brickwork above the generator doors?

Mr. W. T. HOGG (Mitcham) asked if the author had had any trouble with the pumps dealing with the circulating water. He himself had found great difficulty in getting the pump to stand very long. He had lately been trying an experiment, which had, however, not gone on long enough to furnish results. This was to add sufficient lime to the circulating water to keep it alkaline. It seemed to him, if the water was alkaline, the life of the pumps would be longer; and so far his experiment had certainly been successful.

Mr. BRIGGS, in reply, said he had never tried to work out a balance of heat between the fuel which was burned and the gas which was made. It was, however, an interesting question. Of course, there were a lot of innovations in these plants, of which unfortunately most of them had not had experience. The average life of the brickwork depended greatly on the management of the plant and the way in which it was run. Very often the average life would be six months; but it had been known to be burnt out in six weeks. It was possible to work without a steam-spray over the clinkering doors, by using a movable shield inside each door. Doing away with a steam-blast over the doors lengthened the life, as the steam rendered the coke more porous in the region immediately over the doors, and consequently there was more burning away there and damage to the brickwork. As to pumps dealing with the circulating water, at his works they did not use the water over again. With regard to the average life of linings, the percentage of carbonic acid in the gas affected this.

THE GEOLOGY OF DAM TRENCHES.

By Herbert Lapworth, D.Sc., F.G.S., Assoc.M.Inst.C.E.

[Extracts from a Paper read before the Association of Water Engineers.]

The selection of an efficient and economical site for a dam, and the question of deciding when water-tight strata have been reached in the trench excavations, form two of the most difficult problems with which the water engineer has to contend. In reservoirs, as in other engineering works, each case has its own peculiarities; and for this reason it would be impossible to lay down rules, except on the very broadest lines. Hence, the matter of this paper must be largely in the nature of suggestion. There are, however, a few general principles that appear to be common to many dam trenches; and it seemed to the author that the best method of dealing with the subject was to outline these principles, and illustrate them, where possible, by actual reservoirs—mentioning the geological phenomena that have added to the cost or have contributed to the failure or success of the work.

The site of the reservoir having been determined and the approximate position of the dam fixed, a contoured geological map of the site and the area for some distance above and below should be prepared. A mere inspection of the surface indications and a note of the geological beds or strata alone are not sufficient. The various beds should be plotted on a fairly large scale—not less than 1-2500th—so that the map shows the order and levels of the strata.

No geologist would say that it is possible to prepare a detailed geological map of every dam site without considerable help from trial shafts or borings—in fact, the detail required for this kind of work renders the sinking of numerous shafts almost imperative. In the author's opinion, no expense should be spared in these initial explorations. An expenditure of several thousands of pounds is trivial in proportion to the saving that may be effected by such means. Some engineers prefer boreholes; but these are not nearly so satisfactory as trial shafts, which should not be less than 8 or 10 feet square, and in the superficial deposits should be well timbered from the commencement. They should be sunk to considerable depths—occasionally well below what will probably be the final depth of the trench, in order to make perfectly certain that the water-tight strata continue downwards.

Sinking Dam Trenches.

The ideal dam is one which has the whole length of its foundations in water-tight rock with all percolating ground water above the level of the foundations. The object of the trench, of course, is to sink below all loose, open, and unstable materials; these being: (1) Superficial deposits, such as alluvial and glacial beds of sand, gravel, and clay; (2) surface material broken up by weathering and surface movement; (3) surface or sub-surface material broken up by faults, folds, and joints; (4) sub-surface material of a porous or water-bearing nature; and in masonry dams (5), sub-surface material not sufficiently firm to take the weight of the overlying dam. In England, dam foundations are sunk down to, and well into, the solid rock—invariably in the case of masonry dams and generally in the case of earth embankments. In America, the rock bottom, as a rule, is regarded as ideal rather than essential.

Superficial Deposits.

In Great Britain, the superficial deposits consist principally of alluvial and glacial material, and of these only the latter offer serious trouble in dam construction. These glacial beds consist of sheets or masses of clay, gravel, and sand, sometimes of enormous thickness, and deposited in a more or less promiscuous manner over the solid rocks. They are distributed irregularly over Britain north of a line joining Bristol to London, and occupy, in general, the bottoms of the valleys. They may be considered the bugbear of the water engineer in selecting a site for a reservoir embankment, for the very simple reason that their surface indications are very little guide as to what may be expected below in the trench excavations. In this the glacial deposits differ materially from the solid rocks, in which it is sometimes possible to predict fairly accurately what will be met with underground. For this reason, in all cases where glacial deposits are known to cover the solid rocks, it becomes imperative to make an exhaustive examination of the site by means of shafts and the like, before settling on the final central line of the trench, not only because of the uncertain local distribution of these materials and their irregular thicknesses, but because of the very variable nature of the materials themselves.

One of the most important questions arising in connection with the superficial deposits, especially where they are extensive, is whether it is advisable, in the case of earth embankments, to leave the solid rock bottom, and continue the trench in any water-tight layers of the overlying materials. From examples of British dams, it appears that such a course is perfectly safe; from numerous American failures, it seems to be disastrous. The problem appears to be simply a matter of ascertaining whether the water-tight material (or boulder clay as it generally is in this country) lies directly upon solid rock, and is not underlain by water-bearing beds, such as gravel and sand. The fact that a thick mass of boulder clay overlies the reservoir site may often be looked upon, of course, as an advantage in one way—that is, in preventing or lessening the flow of ground water in the underlying materials. But unless thorough preliminary investigations are carried out, it can never be definitely known whether water-bearing beds of gravel and sand may not occur in patches under the clay, and outcrop in the reservoir higher up the valley.

Solid Rocks.

Overlying nearly all solid rocks there is soil, subsoil, and loose rock opened out and broken up by weathering and other agencies. These open materials, of course, in dam trenches have to be penetrated, because they are loose, unstable, and permeable by water. The principal factors producing broken-up surface or sub-surface materials, in addition to weathering agencies, are surface-creep and landslips. A landslip is generally assumed to take place suddenly; surface-creep is a very slow and gradual process. Landslips are generally visible on the surface, though not always so; surface-creep rarely, if ever, makes any sign on the surface.

Landslips should be avoided in the selection of dam sites, not only because of the extra cost due to penetrating the broken-up material before reaching solid rock beneath, but if there is a shaley rock series, there is a possibility of the land-slip moving again after the reservoir is filled, owing to lubrication from the water in the reservoir. The Woodhead dam of the Langdendale reservoirs of the Manchester Water-Works is an example of a dam penetrating landslips.

The surface sliding of material often produces in shaley rocks a buckling-up or folding of the rocks in the centre of the valley. But there is a second cause for these folds, which is more serious, and this is a general or regional horizontal movement of the whole of the rocks. In cases where the folds die out downwards, the movement is attributed by some to general lateral creep, by others to a local movement due to the weight of the hills on either side of the valley squeezing out the beds laterally or horizontally, and resulting in an uplift of the strata in the centre of the valley similar to the uplifting movement in the floors of mines and tunnels. Whatever the explanation may be, the fact remains that such movements have taken place in many districts of the carboniferous rocks in the North of England. There are numerous dam sections showing this buckling-up or wrinkling of the strata in the centres of the valleys, often extending to considerable depths, and producing in the rocks extensive fracturing and faulting, and a general opening out of the beds to the freer percolation of water. In the Derwent Valley these wrinkles are of great depth; and evidence of horizontal sliding is very clear—pieces of shale from trial headings driven hundreds of feet into the hillside being perfectly polished by the movement. Horizontal movements of this sort appear to die out at certain depths below the surface, though these depths may be considerable. They are apparently resisted by thick masses of rock. Thus the Derwent Valley wrinkles die out downwards, when a considerable thickness of massive beds of sandstone is reached, though their effects are continued below generally in the form of faults.

The merits or demerits of faults in dam trenches have been the subject of discussion among water engineers. Some go so far as to say that they prefer faults if they can get them in a dam trench, because they serve as water-tight barriers into which the trench can be tied. Opinions on this question seem to depend mainly on the kind of rocks with which one has had experience. The water-tightness of a fault depends entirely upon the material it separates. If the rocks are generally shaley, the fault rock consists for the most part of fine ground-up shale, often of a clayey nature and water-tight. If, on the other hand, the rocks are of hard material—such as sandstone, grit, or igneous rocks not decomposed—then the fault rock will generally consist of fragments of these materials, with openings allowing the passage of water.

The natural jointing of rocks below the surface independent of weathering influences is, of course, one of the principal reasons why many trenches have required to be sunk to great depths in the solid rocks, especially where the joints have been widened by earth movements subsequent to their original formation. The natural jointing of rocks extends to enormous depths, though the percolation of ground water through them is confined, as a rule, to the higher measures. The tendency of all jointing obviously is to decrease downwards; the joints becoming farther apart, and the width of the openings diminishing. But it is by no means the rule that a trench sunk deep or carried far into the hillsides will eventually reach material in which the joints are so fine, or so widely spaced, as to prevent the percolation of water. In the Howden dam of the Derwent Valley Water-Works, trial headings driven hundreds of feet into the hillside showed no diminution in the jointing of the sandstone beds—in fact, rather the reverse; for at a distance of 500 feet in from the surface horizontally and 250 feet vertically below the surface some joints were as large as 9 inches in width and upwards of 6 feet in height. These remarkable joints below top-water level necessitated the construction of two long wing-trenches, one on each side of the valley, following the top-water line of the reservoir.

Wing and Arm Trenches.

Where there is difficulty in getting water-tight ends to a trench, or where there are water-bearing beds in the trench which outcrop in the reservoir, it is a common practice to divert the line of the main trench roughly at right angles, and proceed up the valley with "wing-trenches" until the water-bearing outcrop is reached, or until a water-tight end is met with. The trench is sometimes

turned into the hill at the end at right angles to the direction of the wing. Where it is a question of founding in water-tight beds such as shales, with overlying open rocks such as sandstone, the direction of the wing-trenches should be determined, of course, by the dip; and they should run in the line of the steepest rise of the bed. In cases where the dip is up-stream, the wing-trenches should run down-stream, though this is rarely done.

The second method of dealing with water-bearing beds outcropping in the reservoir is to run out an "arm-trench" up-stream at right angles roughly to the main trench. This arm-trench may have its top and bottom in water-tight strata, and thus the water-bearing beds between are cut off from their outcrop when the trench is filled; or the bottom may be in water-tight strata, and the water-bearing beds partly cut off by the trench; the remainder on the outcrop above being concreted or puddled over as in the Bottoms reservoir of the Langdendale works. A third method (where, by reason of the geological conditions, no advantage appears to be gained by going up or down stream) is to continue the line of the main trench into the hill in a heading until water-tight material is met with, or for such a distance as is considered sufficient to offer resistance to percolation. The width of wing or arm trenches is generally not less than 5 ft. 6 in. or 6 feet, for convenience of working.

Leakage from Reservoirs.

Where the trench has been carried laterally into the hill to a considerable distance, and some doubt is felt as to the water-tight nature of the ends, some engineers have left vertical shafts at the ends of the completed headings, with means of approach for inspection during and after the filling of the reservoir. This has the great advantage of proving whether the ends are sound, and of locating the leakage if any occurs. The question whether leakage from a full reservoir, either under or around the trench, is serious or not, is one on which opinions differ among engineers of different countries. In America and India, for example, puddle trenches are not carried to such great depths as in Britain. Sometimes the puddle core is altogether omitted, and leakage is expected; systems of drains being provided for carrying away the percolating water. The general opinion in these countries seems to be that it is waste of money to spend large sums in order to stop small leakages of water. So long as the leakage does not affect the stability of the embankment, or wash away the puddle in a clay puddle trench, there is something to be said for this attitude; but the difficulty when dealing with an imperfect piece of trench during construction always lies in deciding what is likely to be the amount of leakage when the full pressure of the reservoir comes upon the foundations. The catastrophes that occurred in the early days of reservoir construction in this country, though not affecting so much the question of selecting sites, have led British water engineers to aim at perfect water-tightness of the trench work; and the general practice is, if possible, to carry the work laterally and downwards into retentive material. It has not always been possible to secure these ideal conditions, the extra cost involved in obtaining them having sometimes rendered such a course prohibitive; and the result has been considerable leakage—sometimes unforeseen, sometimes expected, or even created by leading the water up from the foundations in vertical pipes. The leakage is allowed to escape into the river below the dam as compensation water, and care is taken to protect the puddle by means of concrete. This practice was adopted with the Yarrow dam of the Liverpool (Rivington) Water-Works, where a strong spring was met with about 150 feet below the surface; and since then in many other trenches in this country.

Where the area of the leakage channels is small, or where the frictional resistance of the water-passages is sufficient to prevent high velocities, the tendency is for silting to take place, and for the leakage eventually to cease. This has occurred in innumerable instances in America, India, Britain, and elsewhere. Grouting, or forcing cement grout under pressure, is sometimes recommended as a means of stopping leakage from a reservoir through jointed or fissured rocks. While this may reduce the amount of leakage, it is, in the author's opinion, scarcely ever likely to be successful in stopping the flow, except by an extraordinary chance. Reservoirs that have leaked through open joints have, however, been successfully treated by adding wing or arm trenches, or by subsequent covering of the water-bearing outcrop with a layer of either puddle or concrete.

Dam Trenches in Igneous and the Older Rocks.

Igneous rocks form the foundation of numerous dams on the Continent, and of a few in Britain. The paper does not permit of a lengthy account of the peculiarities of these rocks; but the main characteristic of crystalline rocks generally is the existence of numerous joints, often extending to great depths. These are generally vertical; but in certain rocks, such as granites, they are frequently accompanied by horizontal joints. These joints act as water channels, and generally contain deep-seated percolating water, which is transmitted for considerable distances. These water-bearing joints in the igneous rocks render the trench work in such material exceedingly uncertain. Another very uncertain factor, more especially in the granites, is the depth of decomposed material.

Little need be said in special reference to foundations in the older rocks, except that these rocks generally have been subjected to long-continued compressive forces of such intensity that the material has become greatly consolidated, and the joints, faults, and fissures are tightly closed at shallow depths. The result, as regards reservoir trenches, is that a water-tight foundation is found, as a rule, near the surface, and dam sites on these older rocks are generally more economical than those on the later deposits.

Base of Earth Embankments.

The question of the nature of the material forming the base of earth embankments is so well known to water engineers, and is so frequently discussed, that it is not proposed to enter in detail into the matter. It is sufficient to say that, in selecting a site, any area covered by an appreciable depth of deposits of a soft, slippery, or yielding nature—such as clay, silt, peat, running sand, and the like—should be avoided. The shales of the Lias formation are equally treacherous. If such materials occur on the site of the embankment, they must be wholly or partly removed.

[The paper, which was fully illustrated, concluded with a list of notable reservoir failures and a table of typical British dams.]

Discussion.

Mr. W. Whitaker (Croydon), on the invitation of the President (Mr. E. Sandeman), opened the discussion. He said he thought the members owed a debt of gratitude to Dr. Lapworth for having brought together such a mass of information and put it in such a form that they could make comparisons; for being able to compare was an important matter to members of Associations such as theirs. To put it very shortly, the paper meant that they must do their work in a scientific spirit. The question was: "What is the scientific way to do the work?" Well, by experimenting. The man who did not experiment was not likely to make much progress. Then came the question: "How is experimental work to be done?" Dr. Lapworth had just told them how. He (the speaker) desired, however, to say that they could not have it all their own way. Difficulties would arise, and they must be prepared to meet them. There were cases where boring would do all that was required, and the work would be straightforward. But there were cases in which it would not give all that was required; and in this connection he would remind them that geologists could not do the impossible. They could not attempt to survey all over the country. What the geologist did was to give them a general idea; and they could only get details in the way Dr. Lapworth had set out. The engineer must be prepared for little difficulties after the site for a dam had been decided upon. It was his work to get over these difficulties. He (Mr. Whitaker) had been particularly interested in the remarks made by the author of the paper as to faults and leakages. As to the former, his advice was to avoid them; and in regard to leakages, they could not always depend upon Nature to effectively seal them up.

Mr. G. N. Yourdi (London) said he gathered from what had been said that Dr. Lapworth was of opinion that leakages were a matter of no great importance—that was to say, if they were on a small scale. The question to his (Mr. Yourdi's) mind was more one of drainage area. If this was restricted, they must endeavour to conserve the water as much as possible by not having leakages; but if they had a large drainage area, it would not matter so much. He believed that in the selection of a site for a reservoir the whole of the basin ought to be mapped out thoroughly from a geological point of view. Of course, he recognized that local authorities were sometimes very loth to spend anything on trial holes, regarding it as a waste of money; but, in his opinion, it was no such thing. The experience he had had served to emphasize what Dr. Lapworth had said in regard to the scientific preliminary examination of the ground on which the embankment was to be founded.

Mr. W. Watts (Wilmslow) said the selection of a suitable reservoir site was an important matter; and it should be chosen not only with regard to the physical features of the ground, but also to the nature of the geological strata in which the central trench was to be placed. The site fixed upon was usually the narrowest part of the valley, and where the ground began to widen out to admit of the greatest possible storage for water with the smallest embankment to impound it. If the ground was sound on each side of the valley, such a site was an ideal one, and to be recommended in preference to a longer embankment, even if the central trench had to be carried deeper to secure an impervious foundation. The author of the paper would find it difficult in the Pennine valleys to have the choice of a suitable centre line in a range of 440 yards up or down the stream from a point already acceptable. With regard to plotting the substrata over the surface of a projected reservoir, it seemed to him quite unnecessary, and merely feeling one's way by putting down a number of trial and bore holes, which supplied approximate information only, and was a loss of time and a waste of money in many instances. In his opinion, three trial shafts, excavated on the centre line of an embankment, were sufficient to supply all the necessary preliminary information concerning the nature of the substrata and the probable yield of water for the pumps to cope with. He considered that borings were unreliable to the engineer with respect to the impervious nature of the strata bored into.

Mr. H. Preston (Grantham) thought all present were agreed as to the value of the paper, whether from a geological or an engineering point of view. It showed how closely these two sciences were allied, and also how the engineer was dominated by geology. In his opinion, the author of the paper was wise in insisting upon a careful examination by trial shafts and borings, and in laying stress upon the point that no expense should be spared in these

initial explorations. His remarks as to landslips and faults were also valuable.

Mr. C. Clemesha Smith (Wakefield) said, as leakages would sometimes silt up naturally, he did not see why they should not help Nature by artificial means, and stop the leakages.

Mr. H. Ashton Hill (Birmingham) pointed out that mining operations and the "crowning-in" which sometimes took place might help them in the solution of the problem of the effect of earth movement on sub-surface materials. He described what occasionally took place in South Staffordshire as the result of the mining going on there, even at a great depth. Sometimes the pipe-lines, only a short distance from the surface of the road, were thrown out to the extent of a couple of inches; and in other cases the pressure had been so great that the pipes were split.

Mr. F. W. Hodson (Loughborough) said there was no doubt that water engineers were paying greater attention to the construction of trenches, and the information which had been furnished by the author would be most valuable to members.

The President said he spoke with great caution on the question of wrinkling, as to which there was a considerable difference of opinion. His own impression was there were other reasons than those given; but there was not time to go into them.

Dr. Lapworth, in the course of his remarks on the discussion, said he objected to the system of grouting for the stopping of leakages on the ground that it really amounted to guesswork. He was quite prepared to admit that it might be successful in some cases; but it was only to be resorted to as a last remedy. If they could find a better method, he would advise them not to go in for grouting.

FILTRATION AND STERILIZATION OF WATER.

By Walter Clemence, M.I.Mech.E., and Max de Recklinghausen.

[Extracts from a Paper read before the Association of Water Engineers.]

The increasing confidence shown by engineers in the efficiency of the slow sand filter as a means of purifying water on a large scale for public supply is the result of its proved reliability in all climates during a period of eighty years. Simpson's experiments in 1829 showed that it could be relied upon as a means of improving the physical character of the water; and the arrangement of the experimental plant erected at Chelsea is still generally followed, so far as the proportionate area of the sand to the quantity of water to be filtered is concerned. These proportions give a maximum speed of 4 inches vertical fall per hour. But the average output from ordinary sand filters is not more than 2 inches; the latter figure requiring 1 square foot of sand area for every 25 gallons of water filtered per 24 hours.

In ordinary sand filtration, good average results may be obtained with filters of sufficient area for the speed to be kept within the limits stated above; but in the case of river or other waters, in which excessive turbidity is to be periodically expected, the water, before being passed on to the filters, must be brought to a certain average degree of clarification. Until within recent years, this was usually accomplished by sedimentation in decanting basins or storage reservoirs. But their cost is prohibitive except in the case of large cities; and when river waters are so stored, unusual developments of algæ and other micro-organisms, which seriously interfere with the working of the sand filters, and render necessary an increase rather than a decrease in their total area, are to be looked for.

Dr. Houston, in his third annual report on the examination of the London Water Supply, states that at times the life of the filters, when supplied with stored water, is a question of a few days only, owing to excessive development of algæ; and it would appear from the same report that it is at times necessary to mix raw unstored Thames water with the stored water in order to prolong the life of the filters. This would seem to neutralize to a considerable extent the improvement in the bacteriological condition of the water which is claimed as one of the chief advantages of storage.

On the whole, therefore, it may be said that neither storage nor decantation can be considered a really satisfactory method of treating water previous to sand filtration; and during recent years the efforts of water engineers have been directed towards increasing the output from slow sand filters by studying the working of the filters themselves, and in applying the knowledge gained towards increasing their efficiency, and reducing at the same time the first cost of the plant and the working expenses.

The author proposes to give the results of the working of a large installation and of some experiments with a smaller plant on the Puech-Chabal system of multiple filtration, which has for its object the increased efficiency of the slow sand filter without the use of chemicals. The system is based on the following assumption as to the cause and effect of passing a turbid and polluted water through a bed of sand at a moderate speed. The most obvious effects of sand filtration are three: (*a*) Clarification; (*b*) reduction of organic matters and change in chemical composition of the water; and (*c*) elimination of bacteria of all kinds. As to the causes of these changes, clarification is obviously due to the mechanical action of the sand bed as a strainer. The elimination of bacteria may also to some extent be due to straining. Indeed, for many years it was considered to be entirely so, and that the development of a film on the surface of the sand, either formed naturally of mineral and organic matters left after the passage of the water through the strainer, or artificially by the use of a coagulant, was thought necessary; it being generally contended that any bacteria which passed this surface film would pass freely through the interstices of the sand bed, and be found in the effluent. But long before modern methods of bacteriological research had been developed, it had been discovered by analysis that various chemical changes took place during filtration; and it was not clear that these could be caused by the mechanical effect of straining alone. It was also noted that the reduction in the quantity of organic matters in solution varied according to the speed of the filter; and that while the physical clarification of the water could be satisfactorily effected at varying rates of speed within certain limits, the satisfactory reduction in the amount of organic matter could only be effected by passing the water through the filter at moderate speeds.

The effects of slow sand filtration may therefore be assumed to be: (*a*) Clarification which is due to the mechanical straining action of the sand, and is only to a certain extent affected by the speed of the water through the filter. (*b*) Reduction in organic matters by nitrification, which requires time for the nitrifying organisms to effect their work, and necessitates the passage of the water through the filter at a comparatively slow speed. (*c*) Bacterial purification. In many cases, notably at Altona (cholera) in 1892 and at Cherbourg (typhoid) in 1909, practical and direct evidence has been afforded of the power possessed by slow sand filters of eliminating the organisms of a specific disease from waters known to have been polluted.

The author is of opinion that the process of filtration should be carried out with due regard to the time necessary for the destruction of pathogenic organisms and the reduction of harmful organic matters by natural means, rather than by any attempt at the rapid elimination of the nitrifying and other useful bacteria by sterilization or chemical treatment before the passage of the water through the sand bed. It is admitted on all hands that while certain organisms are harmful, many of those found in river and other waters, and included in the great class commonly called "bacteria," are not only harmless, but absolutely necessary in the complicated processes involved in the purification of water for public supply; and it would seem, therefore, that a water is not necessarily to be regarded as potable because the treatment to which it has been subjected has effected the total elimination of all organisms capable of growing on a gelatine plate under the usual conditions of a laboratory test. In any case, it is certain that slow sand filtration, if carefully carried out, will effect practically complete elimination of the bacteria of all kinds contained in a river water. But it appears that time is an important factor in bringing about this result, and that the efficiency of sand filters, both from the chemical and the bacteriological point of view, is dependent upon the adoption of a slow speed in the passage of the water through the apparatus.

The development of the principle of multiple filtration in recent years is founded on the ascertained fact that the formation of a film, either natural or artificial, on the surface of the filtering medium is neither necessary nor desirable. The pre-filtration plant is so designed that the water is rendered absolutely clear before reaching the final slow sand filter, so that no visible film is formed on the surface of the sand. The speed of the gravel beds and pre-filters is arranged to effect the chemical purification and the reduction in the number of bacteria in proper proportions throughout the various stages of filtration, while the aeration of the water by cascading between each stage of the process replaces the quantity of dissolved oxygen which is lost in passing through the first filters, by which the oxidizable matters in suspension in the raw water are for the most part eliminated. By maintaining the supply of oxygen in solution in the water, the vitality of the nitrifying organisms which pass through the pre-filters is increased, and they effect the final chemical purification of the clarified water on the slow sand filters.

A general description of the large filtration works on this system which were inspected by the members of the Association who visited Paris in 1907 has already appeared in the "Transactions;"* and full details of a somewhat larger plant at Magdeburg will be found in "Engineering." The Magdeburg plant is similar in general arrangement to that at Suresnes, near Paris, and consists of a series of four *dégrossisseurs* (strainers), in which washed pebbles of carefully graded sizes are used. Between these strainers and the final sand filters, the pre-filters of coarse sand are placed. In these and other works erected in recent years, considerable improvement in detail has been effected by the introduction of an arrangement for cleaning the gravel beds by means of air. It has been found that when the gravel is cleaned by turning the bed over with shovels or by means of a jet from a hose under pressure, the grinding action of the pebbles results in the formation of considerable quantities of grit and fine sand, which cause trouble by accumulating in the washout drains. The saving in time and labour when cleaning by the air process is considerable; so that the total area of the *dégrossisseurs* may be reduced; thus effecting great economy in the first cost of the plant. At Magdeburg, it has been found that one man can easily attend to all the gravel filters, including cleaning the beds when necessary, though the plant has a capacity of 16 million gallons per 24 hours.

* See "Journal," Vol. XCIX., p. 34.

The author has received from Herr Dieckmann, the Engineer of the Municipal Water-Works at Magdeburg, the following particulars as to the working of the plant for December, 1910, and January, 1911.

Average Number of Bacteria per Cubic Centimetre from Daily Analyses.

——	December, 1910.	Percentage Reduction.	January, 1911.	Percentage Reduction.
Raw water	50,976	..	9794	..
After gravel strainers . .	2,071	95·93	1865	80·95
After pre-filters	278	99·45	176	98·20
Filtered water	5	99·99	5	99·94

It will be noted that the reduction in the number of bacteria is progressive throughout the process, and that a very large percentage of the bacteria disappear after the passage of the water through beds of gravel alone. No chemicals of any kind are used in these filters.

The pre-filters are of medium coarse sand, and the water is passed through them at a speed equal to about 600 gallons per square foot per 24 hours. At this speed, the bacteriological results are extremely variable; and any increase in the number of bacteria in the river water is followed by a corresponding increase in the pre-filtered water. The condition of the effluent from the slow sand filters, however, remains constant whatever the variation in the quality of the raw water, though the filters have to be worked under conditions from which regular results would hardly be expected, if they were supplied with water from decanting basins. The average time occupied by the water in its passage through the complete series of filters is about 42 hours, during 36 of which the clarified water undergoes final purification in the slow sand filters. The bacterial results of this system of filtration without the use of chemicals are clearly shown by the table; and the chemical results are equally satisfactory.

[From figures supplied by Herr Dieckmann, the author prepared a diagram illustrating the working of one of the largest of the sand filters at Magdeburg, for six months previous to, and for twelve months after, the introduction of the system of multiple filtration described.]

The saving in labour for scraping and in the cost of sandwashing is enormous; and it has been found at Magdeburg that while the effective capacity of the sand filters has been increased by one-third since the addition of the strainers and pre-filters, the working expenses of the whole installation have been already reduced by £750 per annum. The capital cost of the strainers and pre-filters amounted to £1563 per million gallons of water per 24 hours, which is far less than the cost of decanting basins or storage reservoirs which would be necessary to bring the water to anything like the degree of clarification attained during its passage through the appliances described, which, moreover, only occupy one-tenth of the combined area of the sand filters.

The author gave particulars of some trials of apparatus for the filtration and sterilization of water by ultra-violet rays which were carried out by a Commission appointed by the Town Council of Marseilles last year; this being the first application of the system on a large scale. The multiple filtration plant was designed on the same lines as those at Suresnes and Magdeburg; but three strainers were considered sufficient in dealing with the water of the Durance-Marseilles Canal. They were fitted with the apparatus for cleaning by air already referred to; and cascades were also provided between the various stages of filtration. The water was then passed through a pre-filter at the rate of 600 cubic metres (132,000 gallons) per 24 hours. This quantity of pre-filtered water was then divided into three equal parts for final treatment by—(*a*) non-submerged or sprinkler filters, (*b*) an ordinary slow sand filter, and (*c*) sterilization by ultra-violet rays. The results obtained by the first system were found to be very inferior to those obtained from ordinary sand filtration on a submerged bed; and the trials of this plant were discontinued after two months. The slow sand filter was of small area (75 square yards only), and perfect bacteriological results were hardly to be looked for from a filter of these dimensions; yet the results were surprisingly good, though the filter was worked, from the start of the trials, at 6 inches per hour, or 75 gallons per square foot per 24 hours.

The question of the method to be adopted for rendering any particular water fit in all respects for potable purposes is one which can only be decided after the most careful consideration of local circumstances by experts. Experience has shown that turbid river waters can in most cases be rendered absolutely pure and wholesome by sand filtration; and the writer has in this paper set forth the results actually obtained in modern practice. But there can be no doubt that many waters which in their natural state may be considered physically fit for public supply, require to be safeguarded against any accidental contamination by the organisms of water-borne diseases; and the experiments made at Marseilles would seem to show that, in certain cases, the output from sand filters may be considerably increased by the provision of an efficient sterilizing apparatus to deal with undesirable microbes which may appear in the effluent owing to the increased speed of the filters—always providing that the previous treatment by filtration has been conducted in such a manner as to render the water at all times chemically and physically suitable for public supply.

[The second portion of the paper consisted of a communication by Dr. Max de Recklinghausen, Paris, giving the results of the experiments of himself and his colleagues at the Sorbonne on the sterilization of water by ultra-violet rays.]

Discussion.

Mr. Easton Devonshire (London) opened the short discussion which followed the reading of the paper. At the outset he said the thanks of the members of the Association were due to Mr. Clemence for the careful and fair way in which he had prepared and introduced his subject. The paper dealt largely with a system of filtration which he thought was just beginning to be taken up more extensively in England, and had, he believed, been adopted by their President, at the works now being constructed under his direction. He thought also he was right in saying that the multiple system of filtration had really created an epoch in the purification of water. Having referred to the great improvement effected in the water supplies for the public, particularly on the Continent, the speaker said that he could not agree with the statement made by Mr. Clemence that the development of the principle of multiple filtration during recent years was founded "on the ascertained fact that the formation of a film, either natural or artificial, on the surface of the filtering medium is neither necessary nor desirable." Those who attended the conference in Paris would remember that he (the speaker) presented statistics as to the treatment of different water supplies, the effect of which was to show that visible film had been found formed on the surface of the sand after the water had come from the pre-filtration plant. In fact, Mr. Clemence's results were contrary to his (Mr. Devonshire's) Antwerp experiences. But it was the old story—what was good for one place was not good for another. Dealing with water, they would find that a system which answered in one case would not be so successful in another. Then they had to consider the quality of the water to be dealt with. At any rate, he objected to the statement that the formation of a film on the surface of the filtering medium was neither necessary nor desirable. He agreed that the system of the sterilization of water by the ultra-violet rays seemed to be rapidly coming into favour, and was most economical from a water company's point of view. At present there were two big rivals as to the method of the application of the rays; and he thought if the two could be brought together, and combined into one system, it would be of considerable advantage to water engineers.

Mr. C. Clemesha Smith (Wakefield) asked if the author could give the members particulars as to the capital cost of the works he had described, the interest and sinking fund charges, and the working expenses. He also asked Mr. Clemence if he would supply the same details before the pre-filters were added.

Mr. A. J. Price (Lytham) said it seemed to him that they had come to the time—or rather the time was fast approaching—when they would all have to resort to double filtration. As to the speed at which the water was passed through the pre-filters, he was of opinion that a good deal depended on the actual condition of the water to be dealt with when it was received from the river.

Mr. F. Storr (Wrexham) desired to know if, as the result of subsequent observations, Dr. Houston had modified the views expressed in his third report on the examination of the London water, in which he stated that at times the life of the filters, when supplied with stored water, was a question of a few days only, owing to excessive developments of algæ, and that it was occasionally found necessary to mix raw unstored Thames water with the stored water in order to prolong the life of the filters. Referring to the last sentence in the first part of the paper, to the effect that the experiments at Marseilles seemed to show that in certain cases the output from sand filters might be considerably augmented by the provision of an efficient sterilizing apparatus to deal with the undesirable microbes which might appear in the effluent, owing to the increased speed of the filters, always providing that the previous treatment by filtration had been conducted in such a manner as to render the water at all times chemically and physically suitable for public supply, Mr. Storr expressed the opinion that the old-fashioned method, if properly worked, would yield nearly as good results. If the water was absolutely free from undesirable microbes, there was no need to go to the expense of spending money on other methods of filtration.

The President (Mr. E. Sandeman) considered that the great point about the new system was really the question of the cost of maintenance. He thought members would see, from an examination of the process on the ground, that there was a very great chance of his being able to carry out the work at a cost which would be small compared with that of the old system. The filters were not yet working; and water was not being passed through them.

Mr. Clemence, replying to the points raised, said he quite appreciated what had been said by Mr. Devonshire about the film on the surface of the filtering medium. But the results he had given were obtained from experiments he had made; and he thought he was right in saying that at Antwerp, after two or three years' working, the system had been modified, and the advantages of pre-filtering recognized. As to the question of cost, the plant was not more expensive in construction than ordinary sand filters. The capital cost of the *dégrossisseurs* and pre-filters at Magdeburg was £25,000 for a plant of 16 million gallons capacity per 24 hours, which was far less than the cost of decanting basins or storage reservoirs. In regard to the question raised by Mr. Storr, he would refer him to Dr. Houston's later report; but at the same time he thought his remarks were justified as to the algæ.

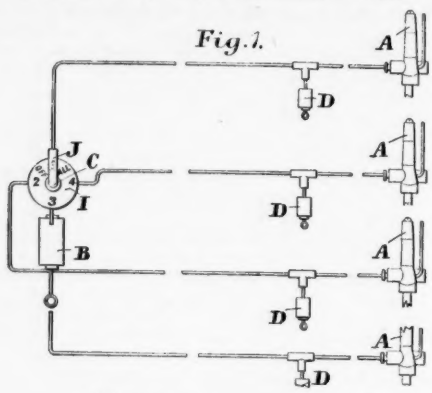
REGISTER OF PATENTS.

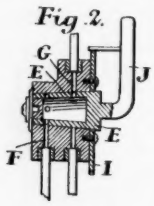
Pneumatic Control for Gas-Burners.

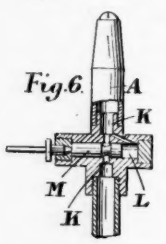
PLOWMAN, T. A. B.; a communication from A. S. Plowman, of New York.

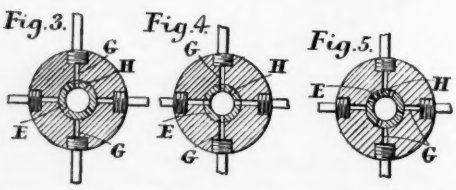
No. 11,347; May 7, 1910.

The object of this invention is to provide means whereby a number of pneumatically operated gas-valves, each of which has its own local and independent controlling mechanism, are operated from a common point, selectively or collectively at will, independently of the local mechanisms. A further object is to ensure certainty of operation by preventing any movement of the reciprocating piston which is usually employed in the gas-valves, except by the intended means.









Plowman's Pneumatic Gas-Lamp Lighter and Extinguisher.

Fig. 1 is a diagram of the pneumatically operated system claimed. Fig. 2 is a longitudinal section of the main control valve. Fig. 3 is a transverse section. Fig. 4 shows the parts in position for "collective" operation. Fig. 5 is a similar section with the parts in the "neutral" position. Fig. 6 is a section of the pneumatically operated gas-valve employed.

The burners A have valves operated by the pump B through a main control valve C connected both with the pump and with the burner-valves. Independent pumps D are connected to the air-tubes as referred to later. The main control valve shown in detail has a cylindrical casing with a tapered bore, which houses a cock plug E held in place by a washer and screw. The plug is bored out and plugged so as to form an internal chamber. The small end of the plug is provided with an annular groove and holes communicating with the interior. A hole F in the casing establishes communication with the interior of the plug. The casing is also bored with four holes G, whose outer ends communicate directly with the air-tubes and whose inner ends register, in turn, with the opening H in the plug when the latter is turned to any one of the positions indicated by the numerals on the dial I. The plug is also pierced with four holes which register simultaneously with the other holes when the cock is in the position indicated in fig. 1 by the word "all" on the dial. The cock carries a handle J, provided with a detent engaging in notches in the periphery of the dial.

In fig. 3, the cock is in such a position that one valve only can be operated; while in fig. 4 its position allows all the valves to be operated simultaneously. In fig. 5, none of the holes in the plug register with the holes in the casing; so that in this (the "neutral") position, none of the valves can be operated from the main pump.

Fig. 6 is a vertical section of one of the valves attached to a burner. A cross-shaped casing has a gas-supply pipe screwed on to the bottom member and a burner screwed on the top; a gas-way being provided by an opening K extending vertically through it. A second hole L, at right angles to K, provides a chamber within which the piston M moves to control the supply of gas to the burner. The horizontal chamber L is entirely closed at one end by plugs, one of which is pierced to provide pneumatic connection for operating the piston. The piston has an annular groove in it, so that when it is at one extreme of its longitudinal movement and touching one plug, gas passes from the supply pipe by way of the groove to the burner; but when the piston is at the other extreme of its movement, the gas supply is cut off.

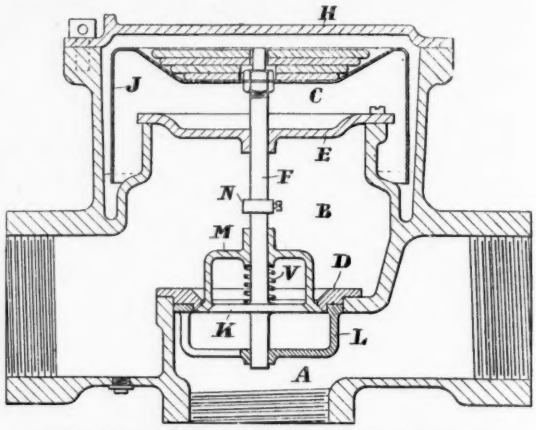
The operation is, briefly, as follows: In fig. 1, the handle J registers with the numeral "1" on the dial; and the connection shown in fig. 3 is thereby established—that is to say, the air-tube of one particular burner only is in communication with the pump B. When the latter is operated to cause suction, air is drawn from the tube, and the burner-valve is moved to allow gas to pass to the burner. If the pump is operated to cause compression, the burner-valve will be closed. When the handle registers with the word "all" on the dial, the connections shown in fig. 4 are established; and all the gas-valves may be operated simultaneously. When the handle registers the word "off," the main control valve is in the "neutral" position, and the valves cannot be operated except by hand mechanism.

Improvements in Gas-Governors.

DOBSON, E., of Wimbledon, S.W.

No. 12,064; May 14, 1910.

This invention relates to governors for town or service mains of the mercury type. It consists "in governing the pressure by a double valve arranged to move into the closed position in the direction of the flow of gas; the double valve consisting of a central smaller valve seated in a larger or main valve, the smaller valve opening and governing while only a small quantity of gas is passing, and the larger valve coming into action when a greater quantity passes."



Dobson's (Foster Engineering Company's) Gas-Governor.

The governor consists of three chambers—A, the high-pressure chamber; B, the low-pressure chamber; C, the control chamber. A is separated from B partly by webs in the casting and partly by the circular plate D containing the main valve-seating. The chamber B is separated from C by a guide-plate E, which serves the purpose of preventing the mercury entering the chamber B in case it should be splashed, and of guiding the valve-spindle F. The plate E does no hermetically seal-off the chamber C from the chamber B; provisio being made for a sufficient amount of leakage to allow the pressure chamber B to communicate with the chamber C—such communicatio being yet so small that a damping action is obtained inside the latte chamber to prevent undue oscillation. The upper portion of the cast ing is covered by an inspection plate H.

The movement consists of an iron cup J adjustably fixed at the upper end of the spindle, towards the lower end of which is attached a smaller or auxiliary valve K; the lower extremity being guided in the three-arm casting L. Upon the spindle is loosely fitted the main valve M, which comprises a seating-ring or valve proper supported by two webs or arms, so that there is a free passage through from the interior of the valve. A sleeve or boss on the webs or arms allows of free (but limited) vertical movement of the valve upon the spindle. A collar N, adjustable as to position, is attached round the spindle in such a manner that, after the spindle has fallen a pre-determined amount, the valve M shall, by the weight of the spindle and its load, be moved from its seating. A helical spring O, pressing upon the valve K and the under side of the main-valve casting, tends to keep the valve M close against its seating at all times except when the cup J falls a pre-determined amount and the collar N forces the valve from its seat, as already indicated.

The invention works as follows: In the instance shown—where both valves are tight against their seats, being taken when the low-pressure outlet is completely closed, as when no gas is being consumed—there will have been a certain flow of gas through the valve after the low-pressure consumption has ceased. This will have passed into the low-pressure chamber, and so to the control chamber, with the result that the cup J would rise, and continue rising until connection was completely cut off between the high and low pressure chambers.

Assuming that the low-pressure service is slightly turned on, the pressure in the chamber B, and consequently the pressure in the control chamber C, will fall. The cup will fall in proportion, with the result that the auxiliary valve K will be opened to a certain extent, and quickly assume such a position that gas will pass through the governor to the service-pipes at the desired pressure. If at the moment of altering the flow on the service or low-pressure side, there should be a small fall of pressure in the chamber B, and consequently in the control chamber C, there will be a corresponding fall of the cup, and therefore of the valve K—thus automatically raising the pressure to the required figure.

The patentee finds that within certain clearly defined limits the auxiliary valve K will continue to move either up or down exactly as the passage of gas through the governor to the service-pipes varies—

maintaining at the same time an even pressure. When, however, its pre-determined range of action is finished (as when the supply of gas to the service-pipe is greater than it can deal with), the pressure in the chamber B will fall; consequently the cup J will fall; and, since the effect of the opening of the valve K is now no longer sufficient, the cup will continue to fall until the main valve M is opened by means of the collar N. The aperture being now considerably augmented, pressure in the chamber B will rise to the required amount; and should the demand on the service side be increased, the main valve will continue to open, and at this point the regulation will be made entirely by it. That is to say, the regulation takes place in two stages—namely, by the auxiliary valve K when the demand on the service-pipe is comparatively small, and then by the main valve M when the consumption of gas increases beyond the pressure regulating capacity of the auxiliary valve.

Telphers.

ROBERT DEMPSTER AND SONS, and BROOKS, P. G., of Elland.

No. 18,490; Aug. 5, 1910.

This invention relates to telphers in which wheels mounted on two or more bogie carriages run on top of a single rail for transporting goods, and in which hoisting gear driven independently of the traversing gear is provided for hoisting the load to be transported.

The hoisting gear is mounted on a rigid and non-swivelling frame below the track; and one or more bogies travelling on the top of the rail are ball-jointed, so as to allow of the telpher travelling around curves without the necessity of employing any knuckle-joint on the bottom frame on which the hoisting-gear is mounted. The main hoist frame or lifting beams and "downcomes" are rigidly connected, forming parts of a framework on which the cabin is suspended; and both the front bogie carrying the traversing gear and the trailer bogie are independent of the framework, which is supported on the bogies by cup-and-ball joints. The lifting motor, gearing, and winding drums mounted on a shaft parallel to the longitudinal axis of the frame are carried on the rigid frame under the track. The function of adaptation to the curves of the track is thus performed only by the two bogies; the remainder of the telpher being rigid. The ball joints will, of course, permit of ready adjustment to the conditions resulting from changes or irregularities in the level of the track, as well as horizontal curves, without transmitting rocking movements of the bogies to the lower parts of the apparatus.

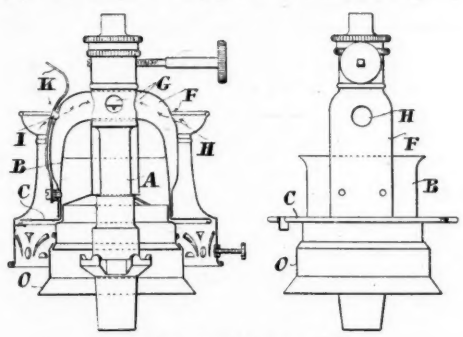
A plant constructed according to this invention, for the Bolton Gas-Works, was described and illustrated in the "JOURNAL" last month, pp. 516 to 520.

Inverted Incandescent Gas-Lamps.

HUBERS, J.; a communication from Julius Pintsch, of Berlin.

No. 20,084; Aug. 29, 1910.

This invention consists in so constructing the body of a lamp and the casing for it that the casing can be easily removed (when the lamp is in working position) without having to unscrew any part. The lamp thus may be used without a casing or with different casings.



A Pintsch Inverted Gas-Lamp.

The illustration shows a longitudinal section of the lamp with the casing in position; also a side view without the casing.

The bunsen tube A carries a ring B, while there is a further ring N, on which a ring O, with a flaring end, is slidably mounted. For protecting the air openings G from the burnt gases, side chambers F are provided, which extend from the ring B and at their upper end enclose the openings. Into the chambers F the air enters through openings H below the openings G, and regulated by shields I carried by a lever K. The side chambers, which close off the openings G from the burnt gases, form pockets into which any dust entering with the air from the openings H falls and is removed afterwards.

The fixed ring B carries at its lower end a disc C provided at its periphery with slots. The outer casing of the lamp is provided below the restricted part with inner projections; so that a bayonet lock is formed by which the outer casing can be readily attached to the body of the lamp.

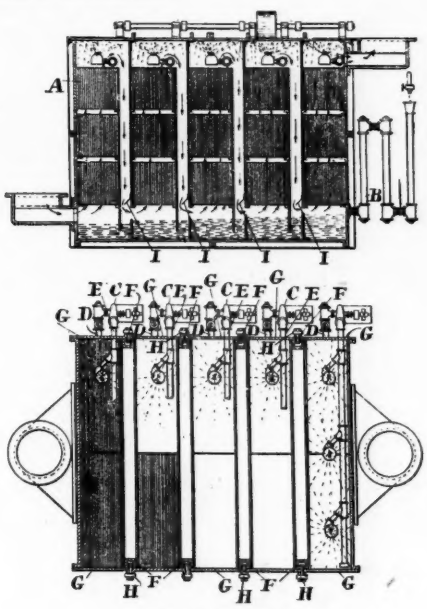
Gas-Scrubbers.

LLOYD, E. F., of Detroit, Michigan, U.S.A.

No. 22,469; Sept. 28, 1910.

The patentee proposes to form (as usual) a number of bays or chambers within a casing by means of partitions so arranged that the gas takes a sinuous course through the scrubber, and to provide within each bay or chamber a plurality of sheet-metal scrubbing trays disposed on edge and maintained apart by dimples formed in them in order to allow the gas to pass between the plates, which are wetted by washing liquor, pumped over and over again from the bottom of each chamber to a spraying or distributing device at the top.

The casing shown is divided by vertical internal partitions so disposed in pairs that the openings through one partition of each pair occur at the top and bottom, and of the adjoining one near to the bottom. The latter openings are so disposed that when water is filled into the bottom of the casing, it stands at different levels between the right-hand partitions, while the left-hand partitions have their lower edges projecting into the liquid so as to prevent the passage of gas under them—the arrangement being such that gas entering at one end is required to take a sinuous course up and down to reach an outlet at the opposite end. Ledges on the casing end walls and the proximate faces of the partitions form supports for scrubbing trays A—stacks of thin rectangular sheets of metal held in spaced relation by stay-rods and either made by being run through a roll in such a manner as to put a slight crimp at intervals across the sheet (preferably at a slight angle to the margin) or else the sheets are irregularly pitted—the resulting bosses standing out from one face of the sheet only, to facilitate assembling. A sufficient number of sheets are bolted together to form a stack which rests upon the ledges on each side of the chamber with the sheets on edge, and are made to only a loose fit to the side of the chamber—the projection of the ledges being sufficient to prevent the leakage of gas between the outside sheets of the bundle and the adjacent sides of the chamber.



Lloyd's Gas-Scrubber.

By reason of a uniform variation in height from the bottom of the openings in the partitions, water, which enters at the outlet end through a supply pipe B, flows uniformly towards the inlet, but is of varying qualities of strength uniformly from the inlet towards the outlet—the strongest liquid being that in the compartment into which the gas first enters. It is also essential that the gas should pass over surfaces uniformly and very thoroughly saturated with such liquor. For this purpose, a series of rotary pumps C are provided. Each pump has its inlet D leading from the bottom of its compartment and its discharge E to spray nozzles disposed in the top of the same compartment and above the body of trays or grids in that compartment. With the pumps in operation, the liquor is being continually drawn from the bottom of each compartment, and is continually being delivered into the top of the same compartment—the excess fed in through the supply pipe overflowing continually to the compartment next ahead of it, and finally away to a drain.

The construction of the casing to enable a device of this character to be built is an important matter, the patentee points out. As a preferred method of building, each pair of the partitions are fastened at each end on opposite sides of a hollow column F or stationary part of the main casing, which has two of its sides parallel for receiving the partitions and its outer face at right angles for receiving a sealing door G. The inner portion of the column is hollow, with openings, on its outer face of such a character that T-headed bolts may be passed into the column from the face and supported at predetermined intervals by webs or partitions (not shown), which likewise form strengthening ribs on the interior of the column. The doors forming the closure to the ends of each compartment are set-up against the outer faces of the columns, and, by means of yokes H passing over the T-headed bolts, are fastened with nuts to the outer face of the hollow columns to make a gas-tight joint. The outer faces of the columns are likewise in alignment with the bottom and end flanges of the casing, and may either be in alignment with a similar flange forming the top of the machine or may have their ends finished at right angles to it, so that they stand between the bottom and top of the casing. By this construction, openings closed with doors are formed for the very ready removal of any of the bundles which may require to be changed by reason of clogging or otherwise—each door and, thereby, the trays in the compartment which it closes being independently removable.

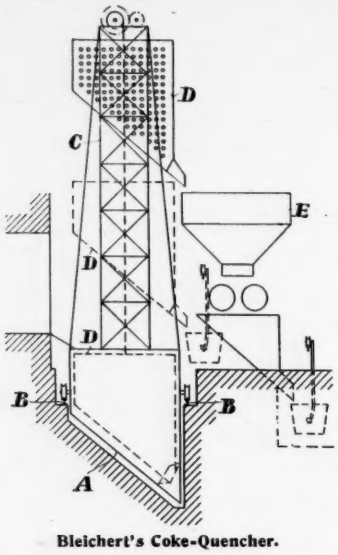
To obtain a further spraying action, near the bottom of each passage, between the partitions in which the gas passes downwardly, is an inclined plate I, upon which a quantity of the water delivered by the sprays impinges, and, by reason of the height of the drop, splatters and forms a spray or mist through which the gas has to pass on its way to the next compartment.

Quenching and Removing Coke.

BLEICHERT, M.A. & P.M., of Leipzig-Gohlis, Germany.

No. 27,478; Nov. 25, 1910.

This invention consists in a modification of the apparatus described in patent No. 19,287 of 1907—a method of quenching and removing coke which consisted in throwing the coke into a perforated receptacle, in a movable reservoir containing water, then discharging the water from the receptacle, and conveying the coke to its next destination in the receptacle, without reloading.



Bleichert's Coke-Quencher.

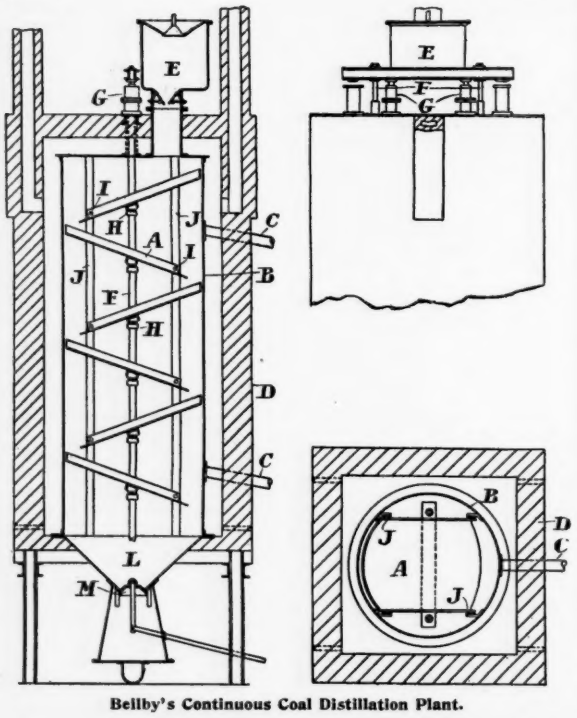
In the apparatus illustrated, A is the water reservoir, which travels on rails B and carries a superstructure C. The latter has at its upper part a winch, by means of which the coke receptacle D, after being charged, can be hoisted from the position indicated by dotted lines in the reservoir to the top of the structure. From this elevated position the receptacle can be deposited on a truck run underneath it, or it can travel to the place where the coke is to be deposited—the coke being, for example, discharged into a hopper E. Or the coke may be discharged into buckets carried by a rope-railway, as indicated by the dotted lines outside the receptacle. These methods of dealing with the coke after it has been hoisted are only cited as examples; the invention not being restricted to any particular methods of discharge from the hoisted receptacle.

Distillation of Coal.

BEILBY, H. N., of Thornliebank, N.B.

No. 22,908; Oct. 4, 1910.

This apparatus for the continuous distillation of coal or other carbonaceous materials is shown in elevation and vertical and horizontal sections.



Beilby's Continuous Coal Distillation Plant.

It comprises a series of superposed plates A (of iron or steel), inclined alternately in opposite directions and pivoted to bars J, enclosed in a shell B (of similar material) provided with laterally projecting off-take pipes C, and a surrounding oven D of brick or the like heated by gas or other fuel. Surmounting the brick chamber is an enclosed hopper E, from which coal is automatically fed on to the uppermost of the series of inclined plates. Mechanical devices—preferably lifting rods F, operated by hydraulic jacks G, and fitted with collars H—are provided for imparting jerks or vibrations to the plates and thereby effecting the downward flow of the coal over them. A hopper L, under the shell B, receives the coke which has passed over the plates, and may be provided with means (such as a mechanically operated valve M) for the continuous or intermittent removal of the coal.

The operation of the apparatus is as follows: The coal to be distilled is caused to pass in thin layers over the inclined plates A; the shell B being heated externally to a suitable temperature. Being in thin layers and frequently turned over during its passage over the plates, the radiant heat from the plates and from the walls of the shell B has free access to the coal, "whereby the time required for treatment is reduced to a minimum, and uniform coking of the material is ensured." The shakes or vibrations imparted to the plates may be adjusted so as to give just such a rate of flow to the material that distillation may be complete as the coke leaves the undermost inclined plate of the series. The gaseous products of distillation passing away by the off-take pipes are, of course, led through cooling or scrubbing apparatus.

APPLICATIONS FOR LETTERS PATENT.

12,282.—BURNEY, W. H., SCRUBY, B., and YOUNG, D. A., "Mantles." May 22.
12,321.—MOLINS, W. E., "Boxes for mantles." May 22.
12,366.—CONINCK, A. DE, "Pipe-joints." May 22.
12,371.—SHEPPARD, T. W. & F. W., "Using the waste heat of internal combustion engines for power." May 23.
12,384.—THOMASSON, I., "Non-soldered joints for lead pipes." May 23.
12,405.—HEWITT, F. J., "Economizing the gas supply to cooking-burners." May 23.
12,444.—DAVID, R., "Gas flash-light device." May 23.
12,498.—HAZLETON, E. B., "Automatic lighting attachments for gas-lamps. May 24.
12,572.—LOWEN, W., "Holder for globes." A communication from F. W. Killing. May 24.
12,596.—GREEN, A. J., "Method of illumination." A communication from C. Martin. May 25.
12,599.—HOLMES, W. C., and Co., LTD., and HOWELL, H., "Distilling bituminous materials." May 25.
12,622.—STIFT, C., "Lock cocks." May 25.
12,630.—EPSTEIN, G. J., "Combustion and arrangements therefor for different purposes." May 25.
12,682.—DALÉN, G., "Storing acetylene gas." May 25.
12,684.—HONIG, A., "Rotary pumps and blowers." May 25.
12,685.—SMALLWOOD, A., "Gasifiers." May 25.
12,687.—FLOYD, J. H., "Gas-valve." May 26.
12,690.—PAYNE, C., "Inverted mantles." May 26.
12,724.—TALBOT, W. J., and TALBOT-STEAD TUBE CO., LTD., "Weldless steel and other metal tubes." May 26.
12,770.—DUNN, W. J., "Acetylene generators." May 26.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress had been made with Bills down to the rising of the House last Friday for the Whitsuntide recess:—

Bills read a second time: Gas Orders Confirmation Bills (Nos. 2 and 4).

Bills reported: Marple Urban District Council Gas Bill, Merthyr Tydfil Corporation Water Bill, Northampton Corporation Bill, Paignton Urban District Council Bill, Rhymney Valley Water Board Bill [preamble not proved].

Bills read the third time and passed: Chapel, Whaley, and District Gas Bill, Chesterfield Gas and Water Board Bill, Gaslight and Coke Company Bill, West Cheshire Water Bill, Wirral Water Bill.

The Guisborough Urban District Council have petitioned against the Gas and Water Orders Confirmation Bill, in respect of the Guisborough Water Order.

HOUSE OF COMMONS.

The following further progress has been made with Bills down to the rising of the House last Friday for the Whitsuntide recess:—

Lords Bill read the first time and referred to the Examiners: Chapel, Whaley, and District Gas Bill.

Lords Bill read a second time and committed: Kingston-upon-Hull Corporation Bill.

Bills reported with amendments: Belfast Corporation Bill; Local Government Provisional Orders (Gas) Bill.

Lords Bill read the third time and passed: Ely Rural District Water Bill.

The Sculcoates Rural District Council have petitioned against the Kingston-upon-Hull Corporation Bill; and the Birkenhead Corporation have withdrawn their petition against the Chester Water Bill [Lords].

Mr. Keir Hardie has given notice of his intention to move the rejection of the Swansea Gas Bill [Lords] when it comes up for second reading.

BELFAST CORPORATION BILL.

The Gas Clauses.

The Local Legislation Committee of the House of Commons, presided over by Mr. E. GARDNER, had under consideration last Thursday the Belfast Corporation Bill, which contains clauses dealing with the questions of differential prices for gas and extensions of the gas undertaking. The differential rate clause was as follows:—

The Corporation may, notwithstanding anything to the contrary in the former Acts or in any Act incorporated therewith, charge differential prices as between gas supplied and used for private lighting purposes and gas supplied and used for any other purposes, and the price to be charged for such other purposes shall be such as may from time to time be agreed between the Corporation and the person to be supplied for such purposes, but in no case shall the price charged for gas supplied for such other purposes be in excess of the price charged for gas supplied for private lighting purposes, and the Corporation may provide such additional mains, pipes, meters, and fittings as may be requisite or necessary for enabling them to supply gas at differing prices for different purposes and for measuring or ascertaining the quantity consumed for each such purpose.

The Hon. J. D. FITZGERALD, K.C. (on behalf of the Corporation), stated that the gas undertaking was an extensive one and produced considerable revenue in aid of the rates. They were now seeking additional powers by the clause to allow differential rates in respect of gas supplied for the purposes of power and cooking, compared with that used for lighting. It was now the practice to charge a lower rate for gas supplied for these purposes than that charged for lighting.

Mr. *J. Dunlop Smith*, the Manager of the gas undertaking, having given formal evidence,

The Committee passed the clause.

On the clause enabling the Corporation to borrow £100,000 for the purpose of the extension of the gas undertaking,

Mr. *Smith* stated that £50,000 was to be spent on mains and services, £30,000 for meters, and £20,000 for cooking-stoves. This, he anticipated, would last for about ten years. The Corporation had expended £48,000 for meters during the last ten years. They had also spent £14,000 on cookers during the past five years. He estimated the life of the mains at 50 years, meters 30 years, and cookers 20 years.

The Committee agreed to the proposals, and granted a term of 25 years for the repayment of the loan.

MARGAM GAS SUPPLY.

A Bill to Purchase Part of the Aberavon Undertaking.

A Committee of the House of Commons presided over by Mr. J. J. MOONEY had before them on Thursday, May 25, the Bill promoted by the Margam Urban District Council, by which authority is sought to purchase the portion of the Aberavon gas undertaking supplying their district.

Mr. VESEY KNOX, K.C., and Mr. C. C. HUTCHINSON, K.C., appeared for the promoters; Mr. WEDDERBURN, K.C., and Mr. MEAGER, for the Aberavon Corporation, who petitioned against the Bill.

At the outset, a question was raised as to whether the Margam District Council Bill and the Local Government Board Provisional Order No. 3 Bill (Borough of Aberavon Order) should be taken as competing Bills or not. The Committee, however, decided to hear the Margam Bill first, and reserve their decision as to whether they passed the preamble until they had heard the Borough of Aberavon Order Bill.

Mr. VESEY KNOX, in the course of his opening, said the Margam district was formed in 1884, and had very greatly developed. It was now considerably more populous than the neighbouring district of Aberavon. Under an Act of 1866, the Corporation of Aberavon were authorized to acquire the undertaking of a little Company who had previously supplied gas there under the name of the Aberavon Gas and Coke Consumers' Company, Limited. The total purchase price was £2241. Under the Act of 1866, the Corporation had no power to supply gas outside Aberavon. The maximum price was 5s. 6d. per 1000 cubic feet; and the total borrowing powers were £5000. There was a curious clause in the Act, which authorized the Corporation to use surplus profits for the public benefit of the inhabitants of the district. Under an Order of 1880, the Aberavon Corporation were allowed to borrow another sum of £5000. In 1884, in spite of the fact that the Corporation of Aberavon had failed to keep up the sinking fund in respect of their own area, they were allowed to extend their gas supply into the neighbouring rural district of Margam, which had just then been formed. The total borrowing powers of the Aberavon Corporation in respect of their gas undertaking amounted to £50,000, practically the whole of which had been raised or would have had to be borrowed to deal with existing capital liabilities; and unless the Committee passed the Provisional Order of the Local Government Board, they would have no further borrowing powers. They were at the end of their tether, and were coming to Parliament for what was equivalent to fresh powers. The Local Government Board had made it clear in drawing up the Order that their desire was that the whole subject should be brought before Parliament; and they had expressly stated in their letter to the Aberavon Corporation that they did not wish to prejudice the question whether or not the Margam Bill should be passed into law. The question which arose under these circumstances was whether it was expedient that Parliament should empower the Aberavon Corporation to raise further sums for the purpose of a gas supply in Margam, or whether the Margam District Council should be allowed to supply their own area. The Margam people had for many years been desirous of having control of their own gas undertaking; and now that the Aberavon Corporation had come to the end of their tether financially, they thought the time had arrived when they might ask Parliament to allow them to buy the gas undertaking and supply their own district. The terms of purchase would be those fixed by the Lands Clauses Act, so that the Aberavon Corporation would get the fullest compensation for their rights. The main reason why the present position had become intolerable, was because of the difference in the relative progress of the two places. Aberavon had increased to some extent; but it was altogether outstripped by Margam. At the time when the Provisional Order was granted in 1884, the population of the whole district of Margam was something like 5000; in 1901 it was 10,065; and in 1911 it was said to be 15,398—an increase of more than 50 per cent. between 1901 and 1911. Aberavon, on the other hand, in the same period showed an increase of only 30 per cent. This he admitted was a considerable increase, and showed Aberavon had a considerable future for its gas undertaking within its own limits. Apart from the fact that Margam was a newer and more commercial place than Aberavon, it was an impossible situation that the smaller town should go on supplying the larger with gas. The difference between the two was more noticeable in respect to the assessable value. In Margam this was £61,000, and in Aberavon only £33,000. Therefore the existing borrowing powers of the Aberavon Corporation in respect of their gas undertaking were about 50 per cent. beyond the assessable value. When the Committee had the figures before them showing how much really required to be done, he thought they would be convinced that it was beyond the financial resources of Aberavon to adequately cope with the problem. As far as the engineers who had been advising the Margam Council were aware, this was an entirely unique case. No other instance was known in the United Kingdom where the smaller place was supplying the larger place with gas. The supply of Aberavon in Margam had never been very satisfactory. There were still many streets in Margam entirely without gas-mains; and in streets where they had been laid, the Council had been obliged to enter into a special guarantee. Between Margam Park and the sea was the natural place where Margam would develop; and all this area was outside the limits of supply of the Aberavon Corporation. Even the supply which had been given was extremely defective; and there had been constant complaints by the Council's Surveyor to the Corporation Gas Manager. The Corporation accounts for the twelve months ended March 31, 1910, showed that in that year they made a profit of £3551. Out of this they had to pay interest on loans £807 odd, making a total of £1624 for principal and interest; and there were bank charges, depreciation charges, and bad debts which left a net profit of £1826. So that assuming one-half the consumers were in Margam and the other half in Aberavon, the Margam consumers were paying £400 towards the repayment of the Aberavon loans, in order that some day or other the gas-works might be the property of Aberavon free of loans. The net profit which the Aberavon people were making was equal to 10d. per 1000 cubic feet of gas sold. The Corporation had paid off all the deficiencies of previous years, and had now a sum of £641 to carry over. This showed that they had come to a very favourable moment for making a change in the condition of the control of the undertaking. He recalled to the mind of the Committee what happened in the Salford and the Glasgow cases. In Salford, the Corporation supplied gas both inside and outside the borough at a profit; and 25 per cent. of their consumers were outside the borough. They came with a Bill for further capital powers before a Committee of the House of Lords, presided over by Lord Donoughmore; and the Committee decided, on the opposition of the outside people, that in future Salford was not to be allowed to make more profit than would cover, firstly, their interest and sinking fund, and, secondly, a sum (he believed it was 1 per cent. upon the capital actually outstanding) which was to cover risk, and so on. All the balance was to be used in the reduction of the price of gas. The Salford Corporation withdrew their Bill; and the decision therefore had not actually become law. But last year Glasgow came before a Committee, over which Mr. Mooney himself presided, to consolidate their Gas Acts; and they were put under more severe restrictions than were proposed for Salford, because the Committee decided that they should not be allowed to carry anything to the common good or to the relief of rates. There had been a provision for the application of profits to the common good; but, as a matter of fact, very little had been so applied. Therefore it could not be said that the Committee's decision rested upon the fact that they had abused their power, as might have been fairly said in the Salford case. He did not say that Aberavon had abused their power in this matter; but he said they had a power which had come to be dangerous. The effect of the Glasgow decision was that, even where the right had not been abused, Parliament felt that it was not in accordance with modern practice that a corporation should be able to carry large sums made from the profit on the supply of an outside district to the relief of rates. It might be argued that there was no danger of this in the present case; but he found in the report of the Accountant dated June 30, 1910, the following passage: "The financial position of the works is, I venture to say, highly gratifying; and were it not for the high overdraft which has been standing for so many years against the undertaking, £1000 of the profit earned could have been ear-marked for rate reduction, leaving a handsome sum over for the establishment of a renewals fund." What was said was, if it had not been for the overdraft, £1000 would have been ear-marked for rate reduction; and half of this sum would have been contributed by Margam. The report went on: "The overdraft is rapidly being extinguished; and I hope in my next statement on the accounts to be able to report that such a fund has been established, so that any additional money required for extensions can be utilized from profits, and not altogether from capital borrowings." So it was anticipated that, if they went on, the Margam ratepayers would be paying towards the sinking fund of the Aberavon Corporation; paying for the relief of the rates of Aberavon; and, further, out of the profits of the undertaking finding capital moneys for the extension of the Aberavon gas undertaking.

Mr. WEDDERBURN: This is a clause you are asking to have inserted in my Order. It has nothing to do with your Bill.

Mr. VESEY KNOX: It was for this reason I thought it would be more convenient that the two Bills should be taken together.

Mr. WEDDERBURN: Perhaps I may be allowed to point out that there is no capital sum named in my Order. It is "such a sum as the Local Government Board may think fit."

Mr. VESEY KNOX said that that put them for ever outside of Parliament—it allowed them to borrow indefinite sums for the extension of the gas undertaking simply with the leave of the Local Government Board. A penny rate in Aberavon produced £120; so that £1000

would be equal to a rate of 8d. in the pound, half of which would be contributed by Margam. Margam had been long looking for a remedy, and had come to the conclusion that the most satisfactory way of dealing with the matter would be to get the control of the gas supply in their own district in their own hands. The Aberavon Corporation could not be harmed. They would get a full price for their undertaking. It would be much better for a town of their size to be free from the obligation to find the large amount of capital which would be necessary if this concern was ever to be properly worked. The enterprise was too big for them, and they ought to be glad to sell part of it at a full value fixed under the Lands Clauses Acts. They had already borrowed more than their rateable value for gas purposes alone; and if they were really to develop the two districts, they would have to borrow probably twice their rateable value in addition. The Council had been fully advised by Mr. Jones, who had selected a very good site for the works on the Port Talbot Railway. They had a large number of customers waiting to be supplied; and there was every prospect that they would be able to sell gas within their district at a cheap rate, even after they had paid full compensation to Aberavon. Under these circumstances, he thought the Bill ought to be allowed to proceed. In their petition, the Aberavon Corporation pointed out that at the present time they were supplying to Hafod-y-Porth one half of the total quantity of gas produced by them. They were first approached probably by the Great Western Railway, and induced to supply gas to the railway station at Port Talbot, and later as the district increased in population they obtained a Provisional Order extending their area of supply to the hamlet of Hafod-y-Porth. In paragraph 5, the petitioners submitted that it would involve great injustice to themselves and the inhabitants of the borough if the Bill were allowed to become law. It was most urgent to bring forward the proposals of the Bill at the present time because these proposals would involve a large waste of public money both by the petitioners and by the Council, inasmuch as the petitioners would be left with works of a size very largely beyond the requirements of the borough. But this was not true. The petitioners went on to point out that the Council would be placed under the obligation of constructing gas-works for the supply of gas which could be given more cheaply and efficiently by the petitioners. Moreover, it would be extremely inexpedient from the Council's point of view to confer upon them the powers sought by the Bill, inasmuch as they would involve the acquisition by the Council of a portion of the petitioners' works and undertaking at a price which must needs be a heavy one. The consequence of the Bill becoming law would inevitably lead to a large increase in the price of gas, both in the borough of Aberavon and in the district of the Urban Council. If he understood this paragraph, the apprehension of the petitioners was that the Council would have to pay them so large a sum for the part of the undertaking which they bought that it would be very bad for the Council. If this were so, so much the better for the Corporation. The petitioners went on to say that there was no demand for gas in those parts of the district which were outside the present limits of supply, and when such a demand arose they would be prepared to extend their mains. There was no proposal before Parliament for an extension of the petitioners' area of supply. A large number of houses were being built outside this area. There was a big district which required to be supplied which they could not legally supply. When the Committee had heard the evidence, he thought they would be of opinion that the Bill was in accordance with the policy of Parliament as laid down in the Model Bill, would be to the advantage of the district of Margam, and would do no undue injury to the Corporation of Aberavon, who would be duly compensated for any loss they might suffer.

Mr. *Godfrey Lipscombe*, examined by Mr. HUTCHINSON, said he was agent for the Margam Estates, and had been a member of the Margam Council since 1902. The District Council controlled an area of about 18,400 acres. In 1884, when the Council was formed, the population was about 5000, the greater part of whom inhabited the village of Taibach. The Aberavon Corporation having purchased the Gas Company in 1866, extended their area by a Provisional Order passed in 1884. After they had obtained the Provisional Order, the Corporation made an arrangement with the Margam Council to lay a main along the road from the boundary of Aberavon up to the railway station—a distance of about half-a-mile. The hamlet contained many large and varied industries. The village of Bryn lay somewhat to the eastward, and was becoming an important district. The District Council were carrying out considerable improvement works. They had spent £61,000 on drainage, and £30,000 on water supply. The Council entered into an agreement with the Aberavon Corporation under which the Corporation undertook to light the public lamps in Margam at an annual cost of £3 per lamp. The Corporation refused to lay down mains in certain streets unless the Council paid a considerable amount by way of interest on capital expended. They had had to pay £58 for gas which they never burned. They now paid somewhere about £600 per annum. The average for the past three years worked out at £630. There were still some streets in the district without gas lighting; and the Council were maintaining oil-lamps in some places even in the Port Talbot district. There had been numerous complaints by consumers of gas as to want of pressure and bad quality, and on some occasions of a total want of supply. Since notice had been given of the Bill, the Corporation had shown considerable activity in laying down mains, and, in fact, had taken the pipes outside the parliamentary boundary. Public feeling in Margam was unanimously in favour of the Bill.

Cross-examined by Mr. WEDDERBURN, witness admitted that Aberavon had supplied Margam with gas at the same price as they charged the people in their own area. He understood that for many years the Aberavon Corporation ran the gas undertaking at a loss. In 1906, the Aberavon people applied for a loan, in order to construct new works. He did not think that at that time there was any talk of a severance. He could not say exactly when the first idea of severance occurred to the District Council; but it had gradually been borne in upon them by the very bad working of the existing system. What first brought the question into prominence was the bad supply of gas. He admitted that the new works were constructed in 1906 to meet the requirements of both Aberavon and Margam. He did not say that the works would be in excess of the requirements of Aberavon if the district were divided. He could only speak of the practical result of amalgamation, which had been bad so far as Margam was concerned. The agreement with respect to public lighting was made in 1906, and was for ten years. He did not agree that, if the Bill were passed, Aberavon would still have to continue the street lighting in Margam. He did not agree that Aberavon and Margam were practically one place. They were divided by the River Avon. Under certain circumstances, it would be a reasonable thing for a town of 25,000 inhabitants to have two gas-works. It was a large area they were proposing to supply. The result of the poll was 1052 for the Bill, and 155 against. The people objected to the present arrangement, which had given rise to a great deal of friction.

In re-examination by Mr. HUTCHINSON, witness said that no part of the area of supply of the Company purchased by the Aberavon Corporation in 1866 was within the Margam district.

Mr. *S. H. Byars*, examined by Mr. C. C. HUTCHINSON, said he had been a member of the Margam Urban District Council for twenty years, and was a Director of the Port Talbot Railway and Docks Company. The trade of the docks was rapidly increasing; and extensions were bound to take place very shortly on the Margam side. These extensions would lead to the erection of a large number of new houses; and as a consequence, the consumption of gas would greatly increase. There was considerable industrial development in the district adjacent to the docks; and he was strongly of opinion that the lighting should be in the hands of the local Council. Since he had been a member of the Council, there had been a good deal of dissatisfaction with regard to the gas supply. This had grown more acute as the district developed. The feeling was decidedly in favour of the district having its own gas-works. At the poll, only 150 people could be got to vote against the Bill, while 1100 were in favour of it.

Cross-examined by Mr. MEAGER: He had no knowledge of any complaint having been made by the District Council to the Aberavon Corporation with respect to the quality of the gas supplied. He was aware that for some years the gas-works were run at a loss; but it did not follow that they ought to have been run at a loss. Profits had been made every year except one since 1904; but these profits were not entirely due to the increase of population. He was of opinion that when a profit was made it should be applied to the relief of the rates in the district where the profit came from.

Major *Gray*, mining engineer, examined by Mr. VESEY KNOX, said he had been a member of the Margam Urban District Council since 1884, and was Chairman for ten years. He was proceeding to give evidence as to the development of the district, when

The CHAIRMAN (interposing) asked whether there was any dispute on this part of the case.

Mr. MEAGER: We say there will be some increase of population; but it will take a long time to come. There is considerable exaggeration as to the requirements of Bryn at the present time.

The CHAIRMAN: Then you practically dispute that the rate of increase will be such as to necessitate a separate supply?

Mr. MEAGER: Yes.

Examination continued: Having regard to the development of the district, he considered it essential that they should have the control of their own gas supply. There had been a great many complaints about the present supply; and he had had to use candles himself before now. A gas supply was required at Bryn at the present moment. If the Council were to get control of the supply, he should advise the laying of the mains at once. There were prospects of a very large increase in the population of Aberavon.

Cross-examined by Mr. MEAGER: There had been considerable increase in the population of Bryn the last ten or fifteen years. The number of ratepayers was 2818, of whom 1500 voted.

Mr. *Richard Evans*, a collier residing at Bryn, examined by Mr. HUTCHINSON, said he was a representative of the North Ward on the Urban District Council. There were 193 houses in Bryn, with a population of about 1000. There was an enormous area of workable coal in the vicinity; and the population was certain to increase rapidly. The inhabitants of Bryn were anxious to get a supply of gas.

Cross-examined by Mr. WEDDERBURN, witness agreed that Bryn was a small colliery village.

Mr. *E. L. Davies*, outfitter, of Port Talbot, said during the last ten years he had made many complaints to the gas manager about the insufficient pressure and bad quality of the gas supplied; and eventually he had to resort to oil-lamps, on account of the total failure of the gas supply.

In cross-examination, he admitted that after the Aberavon Corporation secured their extra borrowing powers from the Local Government Board, matters had improved; and though the light had been dim, there had been no occasion to use oil-lamps.

Mr. *Edward Loveluck*, examined by Mr. HUTCHINSON, said he had resided at Port Talbot for seven years, and was the licensee of the Talbot Arms Hotel. He paid the Aberavon Corporation about £50 a year for gas. He had had to make innumerable complaints about the deficient supply. The light was so poor that it was impossible to read without the aid of candles. Many other consumers had suffered from the deficiency of supply.

Cross-examined by Mr. WEDDERBURN, witness said he had never complained in writing to the Corporation or the gas manager. He had complained verbally to the gas manager. The Corporation sent their fitter, who found the Corporation fittings were out of order.

Mr. *J. H. Davies*, licensee of the Grand Hotel, Port Talbot, gave similar evidence. He had rejected the gas supply and installed electric light, at a cost of £200.

Cross-examined by Mr. WEDDERBURN, witness admitted he had made no complaint in writing to the Corporation. He did not agree that when he complained to the gas manager it was found that the short supply was due to his own defective fittings.

Mr. *John Cox*, Surveyor to the Margam Urban District Council, examined by Mr. HUTCHINSON, produced the agreement under which the Corporation of Aberavon agreed to light certain public streets at a price of 3s. 4d. per 1000 cubic feet, with a minimum rental of £3 per lamp—the mains to be laid by the Corporation. In other streets set forth in the schedule, the Corporation were to lay the mains and the Council to pay interest at the rate of 5 per cent. per annum on the outlay, which was estimated at £335. The minimum rental after all the

mains and services were completed was to be £600 per annum. At the present time, there were about 224 gas-lamps in existence. The supply had been quite satisfactory until the last twelve months. Since then it had fluctuated in character; and the pressure was often below the proper standard. Great inconvenience was caused; and there were loud complaints throughout the district. Since the agreement was entered into, the Council had never burnt the quantity of gas that made up the minimum payment. The mains were carelessly and inefficiently laid, so far as the repairing of the roads was concerned. There was a good deal of leakage through inefficient joints.

Mr. HUTCHINSON: Now, with regard to the complaints, we have only taken them out since 1906; but the witness will tell you they are numerous and voluminous.

Mr. WEDDERBURN asked whether all the complaints related to public lighting?

The CHAIRMAN: No, I think not.

Friday, May 26.

Mr. *Cox* was re-called, and further examined by Mr. HUTCHINSON. He produced the letters of complaint referred to the previous day.

Mr. WEDDERBURN said he could save time at once. In many cases the Committee would hear from the evidence the answer to the complaint was "personal attention." The representative of the Corporation went and saw the people, who were practically in one place; and there was no written answer, nor was it necessary there should be.

In cross-examination by Mr. WEDDERBURN, witness admitted that he had had no experience as a gas engineer. In reply to Mr. Hutchinson the previous day, he said the gas supply had been quite satisfactory up to twelve months ago. He intended to say quite unsatisfactory. It had improved during the last twelve months. The Margam Council were responsible for keeping the burners, &c., in proper order.

Mr. WEDDERBURN said he intended to call Mr. J. Mogford, the Gas Manager at Briton Ferry, who would prove that out of 234 public lamps 81 had broken mantles.

The CHAIRMAN said that, so far as he could see, there had been no complaint since Dec. 15.

Mr. WEDDERBURN remarked that he had been through the correspondence. There were 132 complaints; but 80 of them related to matters over which the Corporation had no control.

Mr. *James Jones*, examined by Mr. VESEY KNOX, said he had several times visited the district of the Margam Council, and had inspected the works of the Aberavon Corporation. He did not consider the consumption of gas in the area supplied by the Corporation was half what it should be. Under 40 per cent. of the houses in the crowded parts of the district were supplied with gas. This was the lowest percentage in his experience. Only 1620 out of 4200 of the houses close to the mains were supplied with gas. This absurdly low proportion was due to the fact that the authority had not done their duty in pushing the sale of gas. The works of the Aberavon Corporation were very good; but they appeared to be badly managed. The percentage of leakage was very high. The Corporation sold only 7000 cubic feet of gas per ton of coal carbonized. It should have been a long way over 9000 cubic feet per ton. He was distinctly of opinion that gas-works erected in Margam could be made to supply more economically and give a better gas than the present supply from Aberavon. He believed there was no other case where a small authority was supplying a larger one with gas. Margam was extending on the south side, which was beyond the area of supply of the Corporation. He would advise the immediate laying of a main to Bryn. It would be a very easy main to lay, and he believed would be remunerative from the outset. He did not think the Aberavon plant would be found too big to supply their own area if the sale of gas were properly pushed, even if the Margam district were taken away. Aberavon could easily absorb all the gas their works were capable of producing; and they ought to do it. The works were sufficient to produce 50 million cubic feet of gas per annum; and the whole of this ought to be consumed in Aberavon. In his opinion, the District Council would not be wise to charge more than 3s. 6d. per 1000 cubic feet to start with. He had prepared an estimate of the cost of the proposed works at Margam. Independent of the price to be paid to Aberavon, which would have to be settled by arbitration, he estimated the cost of the necessary works, condensers, exhausters, purifiers, sidings, and everything at £14,000. These works provided for the production of 40 million cubic feet of gas per annum. He believed they would find a sale for this quantity of gas as soon as they commenced to push the business and developed the slot-meter system, which had been greatly neglected. If the Aberavon Corporation continued to supply Margam, and pushed the business as it ought to be pushed, they would double their present business at a cost of £30,000. The probable increase in the next ten years he estimated at 30 million cubic feet per annum. He put the necessary capital expenditure at £100 per million cubic feet, which would mean a capital expenditure of £66,000 in the two towns during the next ten years.

In reply to the COMMITTEE, witness said gas-works at Margam would cost £14,000. The whole thing, including land, works, mains, meters, stoves, and everything would cost £27,000.

Cross-examined by Mr. WEDDERBURN, witness admitted that one well-managed gas company for a place of 50,000 inhabitants was better than two.

Mr. *E. H. Stevenson* gave evidence in support of the Bill. He said he was well acquainted with the district; and as long ago as 1888 he advised the Aberavon Corporation to remove and construct new works. It was impossible for the Corporation to increase their production without putting down more retorts. During the last five years, the progress of the undertaking had been very rapid. The increase had been at the rate of nearly 9½ per cent. in 1905, 8 per cent. in 1906, 11 per cent. in 1907, about 12 per cent. in 1908, and nearly 20 per cent. in 1909. The consumption could be still further enormously increased with proper management. In all his experience he knew of no case in which the smaller authority was the gas purveyor to an adjoining larger authority; and he regarded it as an outrageous proposition to suggest that a small local authority should take from its neighbouring local authority's district a large amount of profit on gas or water undertakings to assist the rates. In his opinion, the present situation could not continue without injury to the Margam consumers. Examined as to the Aberavon Corporation gas accounts, he said the expenditure worked out at £1060 per million cubic feet in the last year. Aberavon would not without large additional expenditure be able to supply the demand which would probably arise in the united districts.

Cross-examined by Mr. MEAGER, witness said the number of slot-meters in the district was exceptionally small for a working-class population. He considered the Aberavon Corporation had always been slack in their management and in extending their works when it ought to have been done. They asked advice, but did not follow it.

This closed the case for the promoters.

Mr. MEAGER, on behalf of the Aberavon Corporation, immediately called

Mr. *Marmaduke Tennant*, the Town Clerk of Aberavon, who described the negotiations which led to the extension of the gas supply into the Margam district, and denied that any preference had been shown to Aberavon once the supply had been extended.

Cross-examined by Mr. VESEY KNOX, witness said the delay in extending the supply was due to lack of capital. As soon as the capital was obtained, the supply was extended, and the demand for gas was satisfied as far as possible. There had been no complaints about the supply, except the usual ones which came from consumers to a gas-works. Witness admitted that the Corporation laid mains in Margam without legal powers. It was done by agreement with Mr. Talbot on behalf of the Great Western Railway. The legal powers were obtained just at the time the Margam urban district was constituted. There was no suggestion that the Margam people wanted to supply themselves; and he did not suppose that at that time they were in a position to do so. He believed the whole of the ratepayers were then in favour of the extension. Aberavon was quite prepared to incur any capital expenditure necessary to continue the gas supply to the two districts. He did not think more than £10,000 would be required for some years to come. The Corporation had no other capital commitments in hand.

Mr. *A. J. Bond*, Engineer and Manager of the Aberavon Gas-Works, examined by Mr. MEAGER, said the area of the new gas-works was a little over 2 acres. The old works were kept for storage purposes. The output of the works was 264,000 cubic feet per day, which could be increased to 350,000 cubic feet by setting fourteen additional retorts, for which provision had already been made. The present storage capacity was 332,000 cubic feet. He believed the works were quite capable of meeting any demand which was likely to arise for many years to come. Any complaints received from Margam he had given instant attention to, though in some cases they referred to matters for which the Corporation were not responsible. Where there had been complaint of a short supply of gas, it was found to be due to a partial stoppage by naphthalene. The delay in laying mains in Margam he attributed to the difficulty of obtaining plans of proposed new streets. He did not see any prospect of getting for a great many years enough customers in Aberavon to consume all the gas the Corporation could manufacture.

Cross-examined by Mr. VESEY KNOX, witness said he estimated that, if the severance did not take place, the Corporation would have to expend £15,000 in extensions during the next ten years. He would not advise the Corporation to supply Bryn, except at an increased charge.

Monday, May 29.

Mr. *Bond*, re-called, was further cross-examined by Mr. VESEY KNOX. He admitted that the increased consumption in Aberavon last year was 17½ per cent. There were about 2000 houses in Aberavon, between 700 and 800 of which were supplied with gas. He contended that the mains in the Margam district were adequate for the present supply; but some of them would shortly have to be enlarged. He agreed that the price charged for gas was to a certain extent prohibitive; but they were unable to reduce it owing to the high price of coal. There had been no unnecessary delay in supplying public lamps when asked for.

Mr. *F. E. Baker*, Borough Accountant, gave evidence as to the finances of the gas undertaking.

Alderman *Moses Thomas*, ex-Mayor of Aberavon, denied that there was any friction between the Corporation and the Margam Council. In his opinion, it would never pay Margam or Aberavon to take gas to Bryn.

Mr. *William Newbigging* said that he was well acquainted with the Aberavon district. He advised the construction of new gas-works in 1901; and his proposals were carried out in 1906 and 1907. The capacity of the new works was 60 million cubic feet per annum, or 300,000 cubic feet per day. There was ample room for any further extension that might be required. The plant was of the best possible character, and quite up to date. The new works were constructed to meet the growing requirements of Margam and Port Talbot. He considered the proposed severance would be disastrous to Aberavon, even though they received a substantial sum by way of compensation.

Mr. *Corbet Woodall* said he had had large experience in the construction and control of gas-works, and was quite familiar with the position of things in Aberavon and Margam. He had no hesitation in saying that it would not be to the interest of the gas consumers in the district to turn the single undertaking into two. Although Margam and Aberavon were divided by a small stream, they were geographically one place. The existing gas-works were well equipped for, and quite capable of, supplying both districts for some few years to come. There would not be the least difficulty in extending the works on the existing site. It was in the public interest, and the interest of the gas consumers, that there should be no severance.

Mr. WEDDERBURN then addressed the Committee on behalf of the petitioners.

Tuesday, May 30.

Mr. HUTCHINSON having replied on behalf of the promoters,

Mr. WEDDERBURN proceeded to open the Aberavon Provisional Order Confirmation Bill, and to call evidence.

The CHAIRMAN (interposing) said a point had arisen which ought to be settled now once for all. The point was this. If the Committee

were to give their decision on the Margam Bills, the Provisional Order would go before the Unopposed Bills Committee. This might facilitate the procedure in another place. He would say at once the Committee had decided to pass the preamble of the Margam Bill; and this immediately removed the Order from their group, because the Margam people would have no *locus*.

The clauses of the Bill were then gone through, and, with amendments, agreed to. The Chairman was directed to report the Bill as amended to the House.

CUDWORTH GAS ORDER.

The Bill to confirm a Provisional Order conferring certain powers on the Cudworth Urban District Council in respect to their gas undertaking was last Wednesday before the Select Committee of the House of Commons on the Local Government Order (Gas) Bill presided over by Mr. MOONEY.

Mr. SOUTTER (of Messrs. Durnford and Co., Parliamentary Agents) appeared for the promoters. Mr. WILLES JOHNSTON and Mr. BEALE represented the Barnsley Gas Company and the Midland Railway Company respectively, who appeared as petitioners against the Order.

Mr. SOUTTER informed the Committee that the promoters had been in negotiation with their opponents; and the result was that the petitioners were prepared to withdraw their opposition provided the Committee assented to the insertion in the Order of a saving clause. In 1903, the promoters thought it expedient to endeavour to supply their own district with gas; and they accordingly promoted an Order to obtain the necessary power. They did not propose at that time to manufacture gas on their own account, but to purchase it from other undertakings. A clause inserted in that Order enabled them to contract with the Barnsley Gas Company, or any other company, to supply them with gas in bulk. The Order was granted and confirmed by Parliament. The reason why powers to manufacture were not taken at that time was that the District Council thought it desirable to proceed slowly, and to wait and see whether their experiment of supplying the district was successful. Having come to the conclusion that they could manufacture and supply gas cheaper than they could buy it, the promoters now wished to obtain power to manufacture. Up to the present, they had been taking their supply from the Barnsley Gas Company, under the Order of 1903. This agreement was determinable in 1913, by which time, if this Order went through, they would have constructed their works, and would be in a position to supply gas. In the district of Cudworth there were works and a railway station belonging to the Midland Railway Company; and the Barnsley Gas Company were now supplying the Railway Company there, as they had been prior to the Order of 1903. The District Council had no desire to interfere with the supply; but the Railway Company and the Gas Company had begun to fear that if the promoters made gas of their own, they would be desirous of displacing the Gas Company and undertaking the supply. The promoters had no wish to do this; and the saving clause which they now brought up simply preserved the existing position. It would not, however, prevent the Railway Company, if they thought it better, from taking the Council's supply. The position was that, until this happened, the Gas Company would go on supplying the Railway Company at the station. The clause which he now submitted was agreeable to the Local Government Board. There had, of course, been a local inquiry on the merits of the Order. The new clause which the promoters now proposed was as follows: "Nothing contained in the Order of 1903, or this Order, shall prevent the Barnsley Gas Company from continuing to supply, or at any time offering a supply of, gas by agreement to the Midland Railway Company for use by that Company at their Cudworth Station and premises within the district of the Council."

The Committee approved of the proposed amendment; and allowed the Order to proceed.

Fire at the Stockport Gas-Works.

Curiously enough, the day after Mr. S. Meunier, Gas Engineer and Manager to the Stockport Corporation, had been discussing with the Coroner and Jury at the adjourned inquiry as to the explosion at the Stalybridge Gas-Works (reported elsewhere) the chemical reaction sometimes set up in the oxide boxes of a purifier, as throwing some light on the accident, there was a fire from a similar cause at the works at Portwood, Stockport. This was early on Wednesday morning; and the outbreak took place when the oxide-boxes were being emptied. They are Green's purifiers; and the only real danger was the possibility of a crack in the division between the two purifiers and a consequent back-flow of gas. Mr. Meunier, very soon after the fire started, had his own men with extinguishing apparatus at work; but as his staff did not have sufficient hose to effectually deal with the flames, the fire brigade was sent for, and the fire put out in about two hours' time. Under the direction of Mr. Meunier, the plant was soon got into operation again.

Morley Gas Undertaking.—The annual report on the Morley Gas-Works, which has been presented to the Town Council, states that for the past year there is a gross profit of £8235, and a net profit of £1065. The gross profit is £584 more than that for the preceding twelve months; while the net profit shows an increase of £831.

Bahia Blanca Gas Company, Limited.—In the report to be presented to the shareholders of this Company at their meeting on Thursday, the Directors express regret that, chiefly owing to the depression in trade generally, due to the bad harvests again experienced through drought in the southern portion of the Argentine Republic during 1910, the business of the Company shows a considerable falling off for the year ended Dec. 31 last. The profit amounts to £2764; making with the sum brought forward £3688. The Directors recommend a dividend of 2 per cent. for the year on the "A" shares, tax free, carrying forward £688.

LEGAL INTELLIGENCE.

SEQUEL TO A GAS-STOVE EXPLOSION.

Last Friday, at the Clerkenwell County Court, an action was brought by John and Sarah Birch, of Gifford Street, Caledonian Road, against William Stone, a goods porter, of Freeling Street, Caledonian Road, for £49 6s. damages.

Mr. OLIVER was Counsel for the plaintiffs; and Mr. COUMBE for the defendant. The Gaslight and Coke Company, joined as third parties in the action, were represented by Mr. HULTON.

Mr. OLIVER, in opening, said the case raised a point of public importance. Mrs. Birch met with an accident by using a gas-stove supplied by the third parties; and the question was whether or not either the Gas Company or Mr. Stone was liable to her for damages. In December of last year, Mrs. Stone, the defendant's wife, was in a bad state of health, and she entered into an arrangement with Mrs. Birch for the latter to go in and assist in the household duties. On the evening of Dec. 12, a lodger at defendant's house required some food cooked. Mrs. Birch went to the stove, and, on lighting the gas on the ring, an explosion occurred. Her face was badly scorched and her hair burnt. She was taken to the Royal Free Hospital, and had been an out-patient until three weeks ago. She suffered considerably from shock and her nerves were still out of order.

Mr. OLIVER said there was no contractual relationship between plaintiffs and the Gas Company. But he should submit that, so far as plaintiffs were concerned, there was a duty on the part of the Company to see that a stove which they supplied for cooking was in a fit and proper condition for use.

Judge EDGE: When supplied?

Mr. OLIVER: I go further, and say it was their duty from time to time to examine it. The stove was supplied by the Company under contract with the defendant. It is a penny-in-the-slot-meter stove. I am going to submit that the Company are supplying a dangerous thing.

His HONOUR: By no means. It is not a dangerous thing.

Mr. OLIVER: If it gets out of order, it is a dangerous thing.

His HONOUR: You say it is the duty of the Company to inspect it from time to time, and remedy any defects?

Mr. OLIVER: They know perfectly well that, as time goes on, it will become defective; and unless attended to, they know that there will be an accident.

His HONOUR: I am against you, unless you can show me that the Company in the first instance supplied a defective instrument.

Mr. OLIVER: I submit that it will be quite sufficient for me to show that it will become dangerous unless it is attended to.

His HONOUR: I will hear the evidence.

Mrs. *Birch*, giving evidence, said she had never smelt any escape of gas at the stove. As far as she knew, the taps were all right, though they went very easy.

At the close of plaintiff's case,

His HONOUR said it seemed to him that he must non-suit on these grounds: In the first place there was no evidence that the stove was defective when originally supplied to Mr. Stone, or that it became defective during his tenancy of it. There was no evidence to show that the explosion occurred through any defect whatever in the stove. It appeared to him that the explosion might or might not have arisen from a defect in the stove, or it might have arisen from some other cause, of which they had no evidence. There did not appear any evidence to prove negligence on the part of anybody. He must non-suit; but it was an unfortunate point, and he would give plaintiffs leave to go to the Court of Appeal if they wished to.

Mr. OLIVER said his clients would not appeal.

His HONOUR: It is a very interesting case. I should have been very pleased if it had gone to the Court of Appeal.

The Gas Company were awarded costs against the plaintiffs.

Claim for Damage Caused by an Escape of Water.

In the Westminster County Court, his Honour Judge Woodfall was engaged for two days last week in hearing an action in which the Piccadilly Arcade Gallery, Limited, claimed £100 damages from the Metropolitan Water Board for an alleged nuisance, whereby water issuing from a defective water-pipe had percolated through the soil to the premises in Piccadilly and damaged the plaintiffs' basement. The claim was founded alternatively on the alleged negligence of the defendants' servants in disturbing and cutting a water-pipe. Mr. Lever, for the plaintiffs, called evidence to show that dampness had resulted to their property from a leak in a water-pipe near a junction of the service-pipe and the main. On the 16th of December, water flowed copiously into the basement; and the plaintiffs had been deprived of its use for nearly twelve months. It appeared that as soon as the attention of the Board's officials was called to the matter, the service-pipe, which was a disused one, was disconnected, and the flow of water ceased. The plaintiffs did not take water from the Board, but had their own well. On the conclusion of the plaintiffs' case, Mr. Ross-Brown, for the Board, submitted that there was no evidence of negligence on their part; and he cited the case of *Green v. Chelsea Water-Works Company* [reported in the "JOURNAL," Vol. LXIII., p. 285] and other authorities to show that, in the absence of negligence, the plaintiffs could not recover for damage caused by alleged nuisance. His Honour accepted this view, and non-suited the plaintiffs, with costs.

Keighley Water Supply.—The Keighley Town Council have adopted a recommendation of the Water Committee that application be made to Parliament for permission to abandon the projected Bully Trees reservoir in the Sladen Valley and to enlarge the proposed Lower Laithe reservoir so as to serve for both storage and compensation.

MISCELLANEOUS NEWS.

THE EXPLOSION AT THE STALYBRIDGE GAS-WORKS.

Professor Harold B. Dixon on the Probable Cause of the Accident.

Expert evidence as to the cause of the explosion at the Stalybridge Corporation Gas-Works on May 15 (*ante*, p. 544) was tendered at the adjourned inquest on the body of Abraham Norton at the Ashton-under-Lyne Town Hall last Tuesday before Mr. J. F. PRICE, the District Coroner. It may be remembered that while a Walker purifying machine was being overhauled, to find out what was obstructing the passage of the gas, an explosion took place, with the result that the plant was wrecked and that Norton, who was engaged on the job, died from his injuries at the Ashton Infirmary two days later. As such an explosion had not been known to have taken place previously, it was deemed advisable to call in experts to report on the probable causes. Professor Harold B. Dixon and Mr. S. Meunier, the Engineer of the Stockport Corporation Gas-Works, were accordingly invited to investigate and report as to the explosion.

The first witness called at the resumed inquiry was

Mr. *W. Hill*, the Manager of the Corporation gas undertaking. He said that the Walker machine was put in about 22 years ago, and since then it had been renewed in parts many times, and repaired. For some years it had only been worked occasionally, and alternately with the Livesey washer. The last time they worked the bottom part, prior to May of this year, was about two years ago. On May 8 they tried to pass gas through, but did not succeed; and with a view to removing the obstruction, steam was put through on May 10. This was the usual remedy adopted in such cases. It was not, however, successful. The steam was kept on for about 13 hours altogether. Efforts were made daily to clear away the obstruction; and these being unsuccessful, it was decided to take the cover off to investigate the cause of the trouble. This was done on May 15 by his instruction, and under the direction of the foreman, Robert Bennett. When the plate had been removed, he was sent for; and on arriving on the scene he found a light whitish vapour issuing from the opening where the plate had been removed. He gave instructions for the plate to be at once replaced—being under the impression there was an escape of gas from the valves. While Norton and a fellow workman named Williams were refixing the plate, and had got the second nut in, there was a sudden flash, which seemed to come from the top side of the plate, followed by an explosion. The result was to blow about 6 feet of the machine completely away from the bottom. He assisted to get Norton and Williams away from the burning tar to a place of safety, and then proceeded to shut-down the plant. There was a large quantity of tar in the bottom of the washer. He could give no explanation as to the cause of the explosion.

Answering Mr. W. F. IRELAND, the Inspector of Factories and Workshops, witness said he formed the opinion at the time that the obstruction in the washer was due to naphthalene salts. The whitish vapour he saw did not seem to have any pressure behind it. He would not like to say that when the cover was off some grit got into the stud holes. In replacing the cover, it was put into position by a steel bar, which might have generated a spark.

In examination by Mr. POPE, who appeared for the Stalybridge Corporation, witness repeated that the usual method adopted to remove an obstruction in the scrubber was to inject steam, which dissolved the incrustation. He had never previously experienced any trouble when the cover or plate had been taken off. On previous occasions the plate had been off for weeks at a time and been replaced, and everything had gone on all right. From his previous experience, he did not anticipate any danger on this occasion.

Mr. BASTOCK, Solicitor for the widow of Norton, put it to witness that the machine had not been worked for a period of seven years. He (witness), however, said it was worked two years ago.

Robert Bennett, carbonizing foreman at the works, stated that when he saw the fumes issuing from the hole where the plate had been taken off he recognized the danger. The fumes were coming from the top right-hand corner of the opening. He knew combustion had taken place because of the coloured fumes. Norton asked if the plate should be put on again; and witness said "No." Combustion had set up, and it was only a question of time when the explosion would take place.

The CORONER: What would have been the result?

Witness: It would have blown up the washer.

Witness, continuing, said he sent for the Manager, and told him it would be highly dangerous to proceed with the refitting of the plate. He had never heard of a similar explosion before. He had superintended and assisted in taking off the cover of the washer on two previous occasions, and there had been no trouble.

Mr. POPE suggested to witness that there was rust on the iron work inside the washer. He would not agree that this could have been; nor did he see how the explosion could have been caused by a spark, as put to him by Mr. Ireland. He admitted that if the plate had been got on, it would have smothered the combustion, and also that he said to the men that he would not replace the plate himself if he were offered £100 to do so.

In answer to Mr. BASTOCK, witness said the machine had not been in entire disuse for a period of seven years; it had been worked in the interval as a tar-extractor.

Professor *Harold B. Dixon* said that, at the request of Mr. Hill, he visited the Stalybridge Gas-Works on May 20, and examined the washer in which the explosion occurred. He also had an opportunity of questioning the Engineer, the Foreman, and others as to what took place. The circumstances of the explosion were certainly unusual; and he was not able to cite any previous accident of the same kind. It was clear, from the facts placed before him, that a smouldering combustion was set up inside the washer after the removal of the plate, and that the mixture of gas and air which was gradually formed in the washer was fired after a certain time by this combustion going on in the lower part of the vessel. After carefully examining the plant, he was unable to suggest any method by which the combustible substance could have been set fire to from the outside, unless, indeed, some smouldering substance had actually been dropped in when the plate was removed—an unlikely supposition, for which there was no evidence whatever. A flame introduced into the washer when the plate was first removed would have set fire to the gas, which would have burnt with a bright flame without explosion, and must have been noticed. As the result of his examination, he was driven to the conclusion that the rust with which the iron plates of the washer were coated must have been acted on by the foul gas to form a layer of iron sulphide sufficiently sensitive to oxidation to heat-up when the air was admitted by removing the plate, and that the heat so produced volatilized some of the constituents of the tar, producing the smoke observed by the Engineer, who naturally tried to smother the smouldering combustion by cutting off the access of air. The air which had entered and mixed with the gas during the twenty to thirty minutes the plate was removed, must have been just sufficient to raise the combustible to incandescence, and at the same time to produce a highly explosive mixture with the gas. That a sensitive layer of iron sulphide should have been formed in the washer, seemed to be possible, in view of the fact that the washer had been long idle, and that it had been heated a day or two before with steam, and then had foul gas forced into it. He did not think it would be at all easy to reproduce the conditions that brought about this explosion, which was caused, as he read the evidence, by the simultaneous occurrence of unusual events.

In reply to the CORONER, witness said there was no doubt as to the iron plates being coated with rust. He found rust partly sulphided, and took a sample of the rust from one of the plates, which he produced for the inspection of the Jury. It was a most unusual thing for such a condition of things as he had described to be set up simultaneously; and it was a condition which could not have been foreseen.

Asked what he would have done on finding the vapour issuing from the hole where the plate had been removed, witness said he should have done what Mr. Hill did—got the plate on again.

A JURYMAN asked if it would have made any difference had the plate been replaced earlier.

Witness: If the plate had been put on ten minutes earlier, I think it would have stopped the explosion.

Mr. IRELAND inquired if it was not possible that some grit got into the stud-holes, and that, on the re-placing of the plate, a spark was caused.

Witness: It is just conceivable, but, in my opinion, hardly possible. Witness added that he was satisfied rust had formed on the iron plates before the explosion took place, and could easily demonstrate this to the satisfaction of the Jury.

Reminded that water had been poured into the washer for the purpose of extinguishing the flames, and might have set up rust, witness said the rust he found was created before that; and he had samples of the rust from the plates which were blown out of the washer.

Mr. IRELAND: Would it not have been better to ventilate the scrubber before taking the plate off, to exhaust any possible gas inside?

Witness said he did not think he could answer that question; but clearly it ought to be possible. He repeated that he knew of no similar explosion taking place in a scrubber; and he also knew that most gas managers would not believe his report as to the cause of the explosion.

Mr. *S. Meunier*, the Engineer of the Stockport Gas-Works, was next called. He said that on May 20 he attended at the Stalybridge Gas-Works and examined the method employed in getting the Walker washer in and out of operation. Probably the machine had been out of action some length of time, but not opened up. He ascertained that gas was first tried on May 8; and it was found there was a blockage preventing the gas passing through. As this blockage was presumably due to ammonia salts, the usual practice of steaming was resorted to, in order to thin the material and enable it to run out through the overflow-pipes fixed on the apparatus. He understood that steam was on for about thirteen hours, when it was shut off. The plant was allowed to stand until Saturday, May 13, before anything—other than trying the passage of gas, which was done each day—was attempted. It was again tried on the Monday following; the gas being ultimately shut off about 11 a.m. on that day (May 15), and instructions given for the plate to be removed, so that the interior of the apparatus could be examined. This was taken off about five hours afterwards, in the presence of the foreman, who found that the interior of the mechanism was choked with deposit. Mr. Hill, the Engineer, was sent to for instructions, and attended about half-an-hour afterwards. There were no signs of a vapour of any kind when the plate was first removed; but about half-an-hour afterwards, a vapour with a slightly yellowish tinge was noticed to be coming through the opening. The Engineer immediately gave instructions for the plate to be replaced; and it had been placed on the stud nuts, and two or three bolts were in their places and being screwed up, when the explosion at once took place. Mr. Meunier added: I made an investigation for the possibility of the explosion being brought about through any physical means, but failed. A further examination of the interior of the apparatus showed that a portion of this was composed of sheet iron, which had been very heavily covered with rust. This rust is of a similar chemical composition to material which is ordinarily used in gas-works for the extraction of sulphur in the gas, for which it has a strong affinity. This material in ordinary practice, after being put out of use, and emptied from the closed purifier, undergoes a strong chemical reaction, due to the effect of air. This action is so powerful at times as to create sufficient heat to fire the sulphur contained in it. The facts in this case appear to point very conclusively to some similar reaction having taken place within the washer, for these reasons: (1) The apparatus was very old, and the inside plates had not been renewed for many years. (2) It had been out of use some considerable time, and so had allowed the rust on the sheet iron to accumulate. (3) There would be in the crude gas passed through it originally a considerable proportion of sulphur, which would be taken out by the rust on the sheet iron. (4) The admission of the steam would have a tendency to put the material in a more active condition than usual. There was no sign of vapour when the plate was first taken off; but during the half-hour interval, the action of the oxygen in the air upon this rust containing sulphur would have a

tendency to create heat, and this, when sufficiently high, would fire the sulphur, and possibly some of the other impurity contained in the apparatus—namely, naphthalene. The apparatus would contain a certain proportion of gas which, while the plate was off, would gradually escape; its place being taken by air. This mixture of air and gas, when the plate had been put on, and before the fire had been smothered, had evidently reached the proportions required for explosion, with the result known. Such an accumulation of conditions is extremely rare, and cannot possibly have been foreseen, while the methods employed for cleaning out and getting the apparatus into work are quite in accordance with general gas-works practice.

The CORONER: Have you learned something from this?

Witness: Yes; very few gas engineers will believe that the theory propounded is the correct one. But I could not come to any other conclusion. I am perfectly sure there was rust on the sheet iron—a very considerable amount of rust—and I saw some myself. In answer to other questions, he said he had never come across a similar case in all his long experience in gas-works practice. It was a case that would not occur once in ten thousand times; and he should have done exactly what Mr. Hill did under the circumstances.

Replying to Mr. POPE, witness said he should not be surprised if his deductions met with considerable criticism from those in the gas profession. He was, however, quite convinced that he was right. He absolutely excluded the idea of the explosion having been caused by a spark. If the plate had been left off, there would have been an explosion just the same, but not perhaps as great in force. Naturally, one wanted to prevent an explosion, even a minor one as would have been the case had the plate been left off in this instance; and the best thing to do was, undoubtedly, to prevent the explosion by smothering the combustion. He agreed that, in all probability, had the plate been put on ten minutes earlier, there would not have been an explosion at all.

This concluded the evidence; and the Jury returned a verdict of "Accidental death." The Foreman paid a special compliment to Professor Dixon and Mr. Meunier for the manner in which they had placed the matter before them at the inquiry.

It was reported that Griffiths Williams, the other workman who was injured by the explosion, was progressing satisfactorily towards recovery.

WEST BROMWICH GAS SUPPLY.

The Engineer's Report.

The West Bromwich Gas Committee are allocating £1000 out of the past year's profits to the relief of the rates; and the Electricity Committee are giving £800 for the same purpose. Some extracts from the report of the Deputy Borough Treasurer (Mr. Herbert Kirk) will be published next week.

The Gas Engineer (Mr. Harold E. Copp), in the course of his report, says that in the past financial year no less than £1164 has been expended in the maintenance, modernizing, and exensions of various portions of the plant, as compared with only £155 during the previous year. He is of opinion that the expenditure has in each instance been amply justified. Many of the items might legitimately be regarded as capital expenditure; the value of the works having correspondingly increased with the expenditure. The stoking machinery has continued to work in a very satisfactory manner. The maintenance of the plant amounted to 1·07d. per ton of coal carbonized, as compared with 1·43d. per ton during the previous year. The carbonizing wages amounted to £2055, or 1·38d. per 1000 cubic feet of gas made, compared with £2044, or 1·41d. per 1000 cubic feet last year. The amount saved by the use of electrically-operated machines over the old West's manual machines amounted to £1087 during the year.

The coal carbonized during the year amounted to 25,969 tons, yielding 296,150,000 cubic feet of gas, or 11,404 cubic feet per ton, as compared with 27,370 tons, yielding 11,414 cubic feet per ton, during the previous year. The quantity of coke used in the production of water gas was 1014 tons, yielding 61,600,000 cubic feet; and the quantity of oil carbonized was 120,593 gallons, as compared with 52,083 gallons during the previous year. The percentage of water gas was 17·2, as compared with 9·9 last year; and the illuminating power averaged 18 candles. The cost of water-gas manufacture amounted to £2432, or 9·47d. per 1000 cubic feet of water gas made, as compared with 10·33d. during the previous year. During the past year the market price of coke has been abnormally high; and if the cost of fuel used in producing water gas were taken at the average price obtained for coke, the cost of production would have been 10·63d. per 1000 cubic feet, or £2732. On the other hand, the price of gas oil for enrichment has been exceedingly low; and consequently the total cost of the production of carburetted water gas, notwithstanding the high price of coke, amounted to 0·52d. per 1000 cubic feet less than that of the coal gas. The average calorific power of the town gas from the daily tests at the works was 627 B.Th.U., compared with 617 B.Th.U. last year; and the average illuminating power was 16·57 candles, compared with 16·62 candles.

The total quantity of gas made was 357,750,000 cubic feet, an increase of 10,900,000 cubic feet, or 3·1 per cent. over the previous year. The total manufacturing charges amounted to £30,852, as compared with £30,337. The gas used on the works and offices was 5,928,000 cubic feet, as compared with 5,280,000 cubic feet during the previous year. There was an increase in the sales of gas during the past year, amounting to 10,343,619 cubic feet. The sales in the fittings department during the year amounted to £1307, compared with £1428. As anticipated, the show-room in the High Street has proved to be a very great convenience to consumers.

The number of gas-stoves fixed during the year was 114, as against 87 during the previous year. There were also 54 gas-fires fixed, as compared with 16. The number of meters fixed was 377, as compared with 418. There were 210 new services laid and 168 repaired, as compared with 235 and 175 respectively last year.

A 2-inch main has been laid along each side of High Street for the purpose of supplying consumers with gas at pressures up to 5 lbs. per square inch. Although the scheme was started too late to be of much use for the last lighting season, there is no doubt that there will be a large demand for compressed gas during next winter, a considerable number of consumers having intimated their intention of obtaining a supply. Distribution wages amounted to £2549, against £2432.

Net Profits and Expenditure on Maintenance and Extensions.

1909-10.	£	s.	d.	1910-11.	£	s.	d.
Net surplus	4110	14	9	Net surplus	3740	18	6
Expenditure in connection with new carburetted water-gas plant	239	0	0	Expenditure on maintenance and extensions	1214	0	0
Maintenance (painting, &c.).	155	0	0	Expenditure in distribution departments .	401	0	0
	£4504	14	9		£5355	18	6

Difference = £851 3s. 9d. in favour of year 1910-11.

The number of public lamps is now 1098, of which 911 are fitted with incandescent burners, as compared with 1087, of which 846 were fitted with incandescent burners, last year. There has been a further large increase in the number of consumers' burners attended to by the department. This work is undertaken for consumers at very low rates, and has given satisfaction to those who have avalled themselves of the system. Unaccounted-for gas (that is the loss through leakage, condensation, and variations in temperature) amounted to 19,971,781 cubic feet, or 5·58 per cent., as compared with 20,063,400 cubic feet, or 5·78 per cent., last year.

LANCASTER CORPORATION GAS SUPPLY.

Cheap Production.

Last Wednesday, in the Lancaster Town Council, great satisfaction was once more expressed at the success of the gas undertaking; the net cost of the gas produced being 9·49d. per 1000 cubic feet, which is a record for the works. The detailed report of the Gas Engineer (Mr. C. Armitage) stated that the total receipts for the past financial year were £29,804, and the expenditure £18,967, leaving a gross profit of £10,837. Out of this sum, £3385 had been paid for interest on stock and mortgages, £1944 had been added to the redemption fund, £681 paid for income-tax, £3600 contributed to the relief of the rates, and the balance of £1226 had been carried to the reserve fund, now standing at £12,788. The receipts from ordinary meters were £14,149, a decrease of £290; but from 3187 prepayment meters, the receipts were £5071, or an increase of £277. To the public lamps, 17,247,989 cubic feet of gas had been supplied free of charge, which represented a further contribution to the rates of £1652. The receipts from private lamps were £37. Coal had averaged 11s. 0·19d. per ton, against 11s. 1·28d. for the previous year. Coke had contributed in return 6s. 2·19d., and tar and ammoniacal liquor 3s. 11·08d.—making the total return from residual products 10s. 1·27d. per ton of coal carbonized, which was equal to 91·74 per cent. of the cost of coal. The average price received per 1000 cubic feet of gas sold was 1s. 10·25d. Of this sum, gas cost 9·49d.; new mains, services, and meters, 1·12d.; interest on stock, &c., 3·82d.; redemption fund, 2·25d.; contribution to the borough fund in aid of the rates, 4·16d.; and balance to the reserve fund, 1·41d. Nothing had been added to the capital account during the past year; but £967, the cost of new mains, services, meters, and stoves, had been charged to revenue. The total quantity of gas made was 215,580,000 cubic feet, an increase of 285,000 feet; the leakage being 2·72 per cent.

GAS FINANCE AT BOLTON.

The Bolton Town Council last Wednesday approved of the estimates of the various Committees and the contributions proposed to be made by the trading departments in relief of the rates. The Gas Committee had decided to allocate £20,000 in aid of the rates out of profits, and to carry £6500 to the credit of the reserve fund—the amount given being 2½ per cent. on the estimated capital of £800,000, and the same as voted last year. The Electricity Committee's grant is £6500; and that of the tramways, £8500.

It was contended by Mr. Taylor and several others that it was bad finance to take these large sums from the Gas Department in aid of the rates. By the allocation of such a big amount as £20,000 out of the profits of the department, they were taxing the consumers for the benefit of those who did not use gas. The better policy was to reduce the price of gas. After considerable discussion, the Gas Committee's proposals were adopted by a large majority.

The views of those in the Council who are opposed to the granting of large sums from the profits of the Gas Department in aid of the rates are voiced by Mr. Alfred Billing, one of the Elective Auditors for the borough. "Our gas is dearer than it ought to be at this stage," he says. "It is dear because we are not reducing our capital account fast enough; because we carry, not diminishing, but increasing debt and interest charges; and because our renewals at the present time are being paid for by re-borrowing money which has been paid off, and should have been allowed to remain so. Too little depreciation, too much capital, high grants to rates, all mean a postponement of the day when gas will be as cheap to use as coal fuel, and when some of our troubles from smoke may be abated. And all the while we are to be led forward on the assumption that, so long as the undertaking so financed just 'pays' it does not matter. Well, in my opinion, it does matter. We have no right to go on assuming the gas undertaking will always pay, that the capital account may be left to wipe itself out in sinking

fund periods. The Electricity Department has felt the invention of new metallic filaments severely. Its revenue is down, though rate contribution is kept up. The consumption of gas has been greatly affected by incandescent lamps. Who can say what later developments are to follow? It is our duty to so order the finance of all our trading departments that, at as early a date as possible, they shall be in our hands, perfectly equipped with the very minimum of interest charges, and able to give back to us the maximum both of true profits and reduced charges without strain." The present policy of exacting from gas and tramways the uttermost farthing, on the plea that "they can just pay" for the time being should, adds Mr. Pilling, at once be recognized as futile. A member of the Gas Committee had told him that the gas undertaking could not be replaced for anything like the sum it stood at in the books to-day. "I believe it," says Mr. Pilling; "but it indicates a false standpoint. Corporate debt has never been recognized as permanent. Parliament has always taken the view that, as new burdens will come along, old ones must be closed. And, apart from sinking funds, the principle of an accelerated redemption of debt has long been recognized as the best finance in municipal undertakings. All present-day sound commercial development is based on the principle of a low capital account." Mr. Pilling asks if the following figures can be considered truly progressive; and he takes a ten years' period: "In 1901, the gas-works capital account stood at £661,668. In 1911, it stood at £697,918—that is £26,000 increase. We should expect some sort of return for the increase. What do we get? Let us note. Price of gas in 1901, 2s. 5d. per 1000 cubic feet; in 1911, 2s. 4d. That is 1d. down. But let it be noted gas coal in 1901 was costing us 14s. 6d. In 1911, it is 11s. 4d. Coal is cheaper by 3s. 2d. a ton; gas, 1d. per 1000 feet. Let us have some more figures: 1901, capital cost per million cubic feet made, £647; 1911, capital cost per million, £688. Take coal carbonized: 1901, 101,187 tons; 1911, 95,013 tons. There is thus a decrease in production and £26,000 more capital to accomplish it." Mr. Pilling says gas consumers in Bolton have a plain right to resist the policy which involves them in a price of 2s. 4d. for gas. Widnes, he points out, supplies at 1s. to 1s. 2d., Sheffield at 1s. to 1s. 4d., Bury at 2s. "Our engineers," he observes, "have been equal to theirs. We spoil our best efforts by our financial policy. We look at these towns, with our forty years' experience, and proclaim our superior way at 2s. 4d. I say again, judged from the point of view, not of what will just do, but what is best in the interests of ratepayers and gas consumers alike, the present provision for depreciation and debt reduction is inadequate, and the large grant to rates unwise to the last degree. The whole policy that 'profits' come first, and that depreciation is what is left, is preposterous. It is a policy which, consistently carried through all our undertakings, will keep rates up instead of down."

DEVONPORT GAS UNDERTAKING.

Reduction of Price.

The Devonport Gas Committee had under consideration last week the statement of the Borough Treasurer (Mr. H. J. Hoare) on the working of the gas undertaking for the year ending March 31. It showed that a net profit of £4287 had been made; and the Committee decided to recommend to the Town Council a reduction of 2d. per 1000 cubic feet to ordinary consumers, with an equivalent of 2d. to prepayment-meter consumers, and also a reduction of one-half in the rental of stoves, and a discount of 5 per cent. in the charge for street lighting. This is the first reduction made in the price of gas since the undertaking was acquired by the Corporation. The present price to ordinary consumers is 2s. 6d. per 1000 cubic feet; while through prepayment meters, the price is 3s. 4d.

From the Borough Treasurer's statement, it appears that the total quantity of gas sold last year was 372,137,000 cubic feet, an increase on the previous year of 3·7 per cent., which followed on an increase of 4·5 per cent. in 1909-10. The total make was 385,910,000 cubic feet; and after allowing for gas used on the works, there was 10,403,000 cubic feet, or 2·7 per cent., unaccounted for. Of the revenue of the year, which amounted to £73,685, the sum of £47,196 was from sales of gas; ordinary consumers contributing £24,384 and prepayment meters £15,306. The increase in the revenue from sales of gas was 3·70 per cent. The expenditure amounted to £50,763, which included £38,644 for manufacture of gas, £3885 for distribution, £1577 for public lamps, £2500 for rates and taxes, and £1796 for management. The gross cost of the gas worked out at 2s. 6·9d. per 1000 cubic feet, as against an average price of 2s. 6·4d. realized. There was, however, a revenue of £18,677 from residuals, and of £6758 from rentals of meters, stoves, and automatic fittings, bringing the net cost of the gas to 1s. 3·6d. per 1000 cubic feet. The gross profit amounted to £22,922, or 1s. 2·7d. per 1000 cubic feet of gas sold; and after payment of £18,634 for interest and redemption of debt, there is a surplus of £4287, equal to 2·7d. per 1000 feet of gas sold. The gross profit is the largest yet realized by the undertaking, and is equal to 7·06 per cent. on the capital. A remarkable feature of the report is the steady increase in the number of consumers. In 1903, the first year of the Corporation administration of the undertaking, there were only 7923 consumers. There are now 18,061, of whom 11,433 are supplied through automatic meters; while the number of stoves on hire, which was *nil*, is now 1178. The capital expenditure has amounted to a total of £324,724, an increase of £6522 on the year, and is equal to £872 per million feet of gas sold, £8 10s. per ton of coal carbonized, or £17 19s. 7d. per consumer. From the working account, it appears that 38,212 tons of coal or the equivalent were carbonized, and that the make of gas per ton was 10,090 cubic feet. Coal cost 12s. 9·70d. per ton; while for coke the average price realized was 15s. 2·11d. per ton. Tar realized an average of 14s. 5·71d. per ton, and sulphate of ammonia £7 9s. 6·06d. per ton. There are now 60¾ miles of mains, and an average of 297·30 consumers per mile.

The Victoria Station Hotel at Sheffield is to be installed with gas and steam cooking and heating apparatus; and Messrs. R. & A. Main, Limited, have secured the contract in open competition.

COVENTRY GAS AND WATER UNDERTAKINGS.

In the "JOURNAL" last week (p. 613), we gave the principal figures from the annual reports of the Gas and Water Departments of the Coventry Corporation for the past financial year. The reports came before the City Council at their meeting last Wednesday.

Alderman BATCHELOR, the Chairman of the Gas Committee, in moving the adoption of their report, remarked that they considered the accounts very satisfactory—indeed, they created fresh records in many respects. The surplus profit and the quantity of gas sold were greater than ever before. The yield of gas per ton of coal had been larger, and the cost both of carbonizing and purifying was less; while the net result from residuals had yielded 62 per cent. of the cost of coal, compared with 57 per cent. last year. The total quantity of gas sold had been no less than 899,974,600 cubic feet, made up as follows: Ordinary consumers, 654,250,200 cubic feet; prepayment consumers, 221,756,900 cubic feet; public lighting, 23,967,500 cubic feet. The increase over the year 1909-10 was 69,263,700 cubic feet, equal to 8·34 per cent. Last year a reduction of 1d. per 1000 cubic feet was made to ordinary consumers, and 2d. to prepayment consumers; and its cost was estimated as follows: Ordinary consumers, £2675; prepayment consumers, £1572—total, £4247. Owing, however, to the large increase in the quantity of gas sold, this reduction had actually amounted to £4674. But the greater consumption had yielded additional revenue for ordinary and prepayment meters, excluding public lighting, of £4356; being contributed by the two classes of consumers in the following proportions: Ordinary, £371; prepayment, £3985. The extra gas had been nearly the same in both classes—viz., about 34 millions for ordinary and 33 millions for prepayment consumers. There were 8306 ordinary meters in use—an increase of 78; and 4190 cookers, or 68 more. Prepayment meters numbered 13,407—an increase of 1384; and prepayment cookers 12,504, or a rise of 1352. These figures were placed before the Council to show how important the prepayment consumers were to the department, and to justify the reduction of 1d. to which he had referred. Originally the extra charge to the prepayment consumers was 10d. per 1000 cubic feet. Last year it was reduced to 9d.; and now it was proposed to make it 8d. The Committee had very seriously considered a reduction to ordinary consumers, but had decided that to do so now would be premature. There would be the extra cost of purification to meet as soon as the change to lime purification was effected; and, further, the loss on capital, due to the abandonment of the old works, must be met. This amounted to £65,000, of which £29,000 had already been paid off. But owing to the allocation of £14,000 out of profits for the new purifiers at Foleshill, nothing could be provided this year; and the Committee considered that the balance of £36,000 should be wiped out during the next three years. The Committee's recommendation to hand over £4500 in relief of the rates was carrying out the fairly well-recognized policy of paying to the ratepayers, for pledging the rates, 1 per cent. on the capital employed. The Council had already approved of the expenditure of £14,000 upon purifying plant out of profits; and the recommendation now submitted was only the natural result.

A short discussion followed, in which a plea was put in for consideration on behalf of ordinary consumers; and the question was asked as to how much work in gas-fitting had been done by the department, and the profit made thereon.

Alderman BATCHELOR, replying on the debate, which was of an entirely friendly character, said no one had been more anxious than the Committee themselves to do away with the excessive sulphur in the gas. It had been a very difficult problem; and they came to the conclusion that there was no alternative but to revert to lime purification. He thought a saving of quite 6d. per 1000 cubic feet had been made in the cost of manufacturing gas by the establishment of the new works. The amount of work done in gas-fitting by the department, speaking from memory, was about £2000 per annum, at a profit of 30 per cent.

The report and recommendations were unanimously adopted, as was also the proposed reduction to prepayment meter users.

In moving the adoption of the report of the Water Committee, Alderman DRINKWATER, the Chairman, remarked that in a rapidly growing city like Coventry it was very important that they should keep well ahead of all demands on their resources. The endeavour had been to provide a full and ample supply, and to conserve this as much as possible. Considerable saving had been effected by a house-to-house inspection, as well as by a night inspection of their mains. The profit made this year (£7499) compared with £5577 last year.

In the course of a short discussion, it was pointed out that the scale of charges had been increased by 25 per cent. Exception was taken by some speakers to the principle of making profit for the sole purpose of devoting sums in relief of rates. It was strongly urged that a more satisfactory policy would be to make the charges as low as possible, as the idea of rents being governed by rates was open to criticism.

Alderman DRINKWATER, in reply, contended that experience had proved that owners of property fixed their rents according to the rates they had to pay, and that when there was an increase in the rates the rents were advanced correspondingly.

Mr. PRIDMORE, the Chairman of the Electric Light Committee, urged that the position of the Water Department was different from that of either the Gas or the Electricity Department, and that the aim should be to give something in relief of rates out of the profits.

Alderman DRINKWATER said the scale of charges for water in Coventry was really lower than in most towns; and, moreover, they had to face a further large outlay very shortly in the provision of an additional reservoir. Consequently, they must not expect such large profits as had been shown in the past.

The report was unanimously adopted.

New Joint-Stock Companies.—The Alston Gas Company, Limited, has been registered, with a capital of £5000, in 2500 ordinary shares of £1 each, and 500 preference shares of £5 each; the Chipping Norton Gaslight and Coke Company, Limited, with a capital of £10,000, in £5 shares; and the Haverton Hill on Tees Gas Company, Limited, with a capital of £3500, in £1 shares.

SOUTH AFRICAN LIGHTING ASSOCIATION.

Electrical Competition at Port Elizabeth.

The Ordinary General Meeting of the Company was held last Wednesday, at the London Offices, No. 90, Cannon Street, E.C.—Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said that, though he was not able to say that the Company had turned the corner in regard to the state of the business at Port Elizabeth, and though the accounts still showed a decrease in the consumption of gas there, he thought the shareholders might look with some satisfaction upon the statement of accounts this year, inasmuch as it exhibited an increased profit, and enabled them to carry forward a larger amount than in the previous year. The competition that was going on with the electric light, of course, had a constant effect upon their working. They lost the large lighting consumers as they had lost the public lighting; but, by the energy of their officials, and by constantly bringing to the notice of the consumers and inhabitants the advantages of using gas for cooking and other purposes, they still had a large number of consumers—they were keeping up the number, and the business was satisfactory. In addition to this, they had, as he held out the hope last year, been able to make considerable savings in costs and expenses. It was largely due to this that they were this year able to show an increased profit, though on a smaller output of gas. The decrease in money in Port Elizabeth amounted to a sum of £2500 odd. This, naturally, was a very serious loss to the Company; and they could not recoup it entirely by savings in manufacture. The general expenses and the establishment expenses on the works could not be materially reduced when the quantity of the output was diminished; and therefore, on the face of it, it looked as though there was an increased cost of their commodity, although there was a diminished quantity made. But, as he said before, they had an increased profit. The profit at Port Elizabeth amounted to £4971, as against £4899; but when they added the reserve fund and deposit interest and so forth (£362), it brought the profit to £5333, which was an increase of £524 compared with the previous year. This sum, in these hard times out in the Colonies, was not to be altogether sneezed at. The investment was not a bad one. There had been some savings this year. For instance, they had not paid any income-tax in South Africa, though they had had to do so here. Whether this was simply a lapse of the tax for one year in South Africa, or whether it was to be continued, could not be said. But, as a matter of fact, on last year's working they did not in South Africa have to pay income-tax on their profits. This was a saving the Company appreciated. They had had a slight falling off of consumers—only four; so that the number was practically the same as the previous year. They had an increase in the automatic and prepayment consumers, while they had less in ordinary consumers. This was only to be expected from the electrical competition. No alteration had been made in the price of gas. The price of coal had been absolutely more during the year—by about 1s. 5d. per ton; but in the current year, he was happy to say, they would be able to save something like 1s., or a little over, per ton, according to the present contracts. They continued to work very well in the manufacturing department. The make of gas was, he thought, good; being an average of 11,178 cubic feet per ton, which was not bad out in South Africa, although, of course, at home they aimed in these days at something a good deal higher. They had a growing number of cooking stoves in use. The number was now 1325 in Port Elizabeth; and he really thought that this was the best part of the business for them to look forward to, because, after all, heating was not affected nearly so much by electricity as was lighting. The ammonia plant to which he referred at the last meeting had been in continuous work. They had not quite realized the profit he anticipated from it; but they had realized about £250 from the sale of the cloudy ammonia in bottles. The trade was very good; and he thought it would improve, and would realize a considerable profit for them. They had a tremendous demand for tar out there, and almost exclusively for road purposes. They had actually had to send out a large quantity in order to supplement their make, and to retain the trade and contracts. They made a profit on the tar sent out, although it was an expensive thing to do. He thought that people who had to deal with the sale of tar from gas-works in this country would be astonished at the prices paid for this secondary product out in Port Elizabeth for road purposes. The Engineer reported that the works and plant were in thorough good order; and although they had saved a large amount in repairs and maintenance this year, it must not be taken that this indicated they had not been keeping up the works in a perfectly proper way. Turning to Grahamstown, the statement was of a more hopeful and satisfactory character. There the sale of gas had been increased by something approaching ¼ million cubic feet. Business was gradually improving there. The Company had added to their consumers; and had fixed new public lamps. Indeed, at Grahamstown, they were kept fairly busy. The number of consumers increased last year by about 30. Of course, there, as at Port Elizabeth, the Company were affected by the cost of coal—rather more so, in fact, because the railway freight had been added to considerably between Port Elizabeth and Grahamstown—when it was not Colonial coal that was being carried. The Company would be delighted to make use of Colonial coal as soon as they could do so. They were constantly trying what could be done in this direction. There would be a saving all round if they could get as good local coal as the coal they were carbonizing now, and could get reliable deliveries of it. They had not succeeded in doing this yet; but they had not lost sight of the matter. He did not think there was anything more he need say in regard to the accounts. He supposed generally the state of trade in South Africa might be said to be of an improving kind, although his colleague (Mr. J. Macalister), who had a great knowledge of the commerce of South Africa, said that Port Elizabeth did not get its fair share of growth in business. It would be seen that the Directors proposed to pay the same dividend as last year; and this would leave a carry-forward of £821.

Mr. A. L. DON seconded the motion.

Mr. DUTTON thought the shareholders generally would be glad to have a little more information printed in the profit and loss account, in order that they might themselves make comparisons as to how the business was going. He should like to see the amount received from the sale of gas, so as to ascertain whether the consumption was going up or down; and he should like to know how much was spent on coal, on works management, and so on. But the only thing the shareholders were told was that there was a balance of net revenue of £8157. Personally, with great respect, he said that he did not think the absence from the accounts of the items necessary to make comparison was at all satisfactory; and he would ask the Directors to consider whether they could not supply more detail. Another thing upon which information did not appear in the accounts was depreciation; and in more prosperous times than the present they used to set apart an amount to the reserve fund, which now stood in the balance-sheet at £27,000. He did not think anything had been transferred to the fund for the past two or three years. In struggling to maintain a respectable dividend, he thought the shareholders would like to know that this was not being done at the expense of proper provision being made for depreciation. If the Directors were not writing off for depreciation, they ought to be putting to reserve. He hoped it would not be taken that he was making this criticism in any unfriendly spirit.

Mr. A. MITCHELL congratulated the Board on the fact that, in the face of keen competition, the accounts had turned out better than last year. After what they heard last year as to the serious electrical competition, he was pleased to find that, although the consumption had gone down a little, the financial side of the accounts had improved. He did not want to be too sanguine over the business. He knew quite well how keen the competition of the electric light was at home. He did not know whether in South Africa they had to put up with the same difficulty as at home in regard to municipal competition—that was, selling at a loss, or practically selling at a price which left a deficiency at the end of the year. This was the most unjust competition that gas companies had to deal with. The Company had met with a severe check; but he thought it had suffered in this way: He believed they had an excellent Engineer and Manager at the Cape, who, before he had to meet electrical competition, had got his consumption up to a very high pitch; and whereas some of them at home who had to meet electrical competition some years ago had a margin that had not been cultivated upon which to fall back, their Manager had cultivated his so well that he had not a similar margin. Under the circumstances, they could hardly hope he would be able to maintain the position of the Company when he had to meet the competition. This was really to the credit of their Manager. The fact that he was unable to recoup the loss of big consumers all at once showed that he had pretty well filled up all he could do with gas before he had to meet the competition. He (Mr. Mitchell) was sanguine enough to believe that gas companies could supply the best light at the cheapest cost; but, notwithstanding this, they found some consumers would have the electric light. He had in mind at the moment one business place that was lighted with inverted gas-lamps brilliantly inside and out as compared with the next door neighbour who used the electric light; but this did not prevent the latter using electricity. As the Chairman had remarked, gas undertakings did not depend on lighting alone. That was where they had an advantage over the electric light people. A large field had been opened up to gas for cooking, heating, and many industrial purposes; and he believed the use for these purposes would exceed in time the business they were doing in lighting. He believed the time would come when solid fuel would be little used. As their towns in South Africa grew, he was of opinion that they would have a large increase in the use of gas there for cooking, heating, and industrial purposes. He did not think there was anything in the condition of the Company but what one must feel satisfied with. At Port Elizabeth, as at home, he hoped that every effort would be made to cheapen production, and to take out of every ton of coal all that could be obtained, while purchasing the coal as cheaply as possible. If this were done, though the Company had met a check, its future was just as sure as the past.

The CHAIRMAN, in reply, said he was certain the criticisms that had been made were advanced in a perfectly friendly spirit. Regarding the publication of more detailed accounts, it must be borne in mind that they could not put a Colonial gas company like this on the same footing as a statutory gas undertaking in this country. They had in a Colonial gas undertaking many more difficulties to meet. In their own case, they had two entire works—one at Port Elizabeth, and one at Grahamstown. At Grahamstown they were under certain concessional conditions which did not apply to the other place; and, under such circumstances, it was not always desirable to publish details of the accounts. Then they had experienced very keen competition from the electric light; and it was not always desirable to let one's competitors know what one was doing. There was nothing in the accounts to hide from the shareholders. If any shareholder wanted information in regard to any particular items, he could have it in the fullest detail; but they must refrain from publication. As to maintaining the works, or adding to reserve, or writing off for depreciation, the Board first of all spent a large sum of money on maintenance and repairs. He might say in general terms that they expended twice as much per 1000 cubic feet on repairs and maintenance of works, fittings, and meters as was done in the case of most gas companies in England. There was no need to depreciate to such a large extent when maintenance was carried on so generously. Still they did depreciate, and considerably. Fittings, stoves, and meters were depreciated every year; and he thought that anybody who looked into this would say there was not anything of which to complain in this respect. The profits of the Company would have been larger if the Board had not treated depreciation so liberally. They were not maintaining a high dividend at the cost of not keeping up the plant or not writing off for depreciation of the undertaking. It was quite the reverse. He was much obliged to Mr. Mitchell for his

remarks, because his practical knowledge of these matters shed a great deal of light on some of the questions in which they were interested. In their Engineer and Manager (Mr. Arnott), they had a very energetic man. By his foresight, energy, and zeal, he had practically kept off the competition of the electric light for a good many years; but now he was face to face with it. He (the Chairman) did not take a despondent view of the position. He believed it was thoroughly prosperous and good; and he was pleased to be able to speak so well of the growth of the part of the undertaking that was situated in Grahamstown.

The motion was carried unanimously.

Mr. HENRY WOODALL moved the declaration of a dividend of 4 per cent. (making 7 per cent. for the year), free of income-tax. He remarked that he was happy in feeling more hopeful in the future. He believed they had touched the lowest depths of their misfortunes; and that another year would show a more handsome profit than the present year.

Mr. J. MACALISTER seconded the motion, which was adopted.

Moved by the CHAIRMAN, and seconded by Mr. JAMES CLOUDSLEY, Mr. A. L. Don was re-elected to his seat at the Board.

On the proposition of Mr. G. CRISPE WHITELEY, seconded by Mr. MITCHELL, the Auditor (Mr. P. D. Griffiths) was reappointed.

A hearty vote of thanks was passed to the Chairman and Directors, and to the officers and staffs at the Cape and in London, on the motion of Mr. WHITELEY, seconded by Mr. J. L. CLOUDSLEY.

The CHAIRMAN responded; and the proceedings terminated.

FITTING UP HOUSES AT ROMFORD GARDEN CITY.

The Garden City at Romford, which was begun in July last, was opened on Thursday, under the auspices of the President of the Local Government Board (the Right Hon. John Burns). The ideal weather that prevailed enabled the visitors, who numbered many hundreds, to inspect at their leisure the methods adopted for the abolition of the smoke nuisance. Among the manufacturers who have contributed in this direction are the Richmond Gas Stove and Meter Company, Limited, who have supplied complete installations in one or two of the unique and pretty villas in the city, making the interiors as useful and comfortable as the exteriors are beautiful.

The dining-rooms have been supplied with their "Egyptian" gas-fire, finished in green porcellanite enamel, which, harmonizing as it does with the general surroundings, is in very good taste. The study is fitted with the "Arabian" gas-fire, finished in green and brown porcellanite enamel. This fire can be supplied with a boiling-burner if desired. The bedrooms are also fitted with the "Arabian," in colours suitable to the surroundings—light and rich green, light blue, and brown—all finished in porcellanite enamel. Considerable thought has been bestowed upon the scullery and kitchen, and care has been taken to provide everything for the economy and comfort of the tenant. A "Model" gas-cooker ensures a constantly clean and cool kitchen; while the "Blackpool" washhouse boiler will help to keep the expenses down with regard to the washing. The "Gulf Stream" water circulator supplies hot water to all parts of the house, and provides a hot bath and a continuous supply of hot water day and night.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The accounts of the Dundee Corporation Gas Department for the year just closed show that, in spite of bad trade and a practically stationary population, the consumption of gas in the city is steadily going up. The total quantity delivered during the past year was 924,313,000 cubic feet, as against 879,602,000 cubic feet the previous year. The total revenue was £130,610, as compared with £125,400. In both periods the price of gas was the same—2s. 3d. per 1000 cubic feet. Of the total income, £94,483 was for gas sold, as compared with £91,099 the previous year. Coke realized £19,908, as compared with £18,691; sulphate of ammonia, £10,870; and tar, £5021—both an increase on the previous year. The expenditure amounted to £99,192, leaving £31,417 to be carried to the net revenue account. Coal cost them £50,499. The total expenditure on the manufacture of gas was £73,100. Distribution cost £14,942; rents, rates, and taxes amounted to £6681; and administration to £4468. Of the balance carried to net revenue account, £6036 has been applied in the payment of annuities, £8540 was required to pay interest, and £11,297 was placed to sinking fund. After paying other charges, there is a net surplus on the year of £2472—a slightly larger amount than was left over last year. The capital debt on the gas-works now amounts to £378,600, as against £383,994 a year ago. During the year, 84,518 tons of coal were carbonized. The total net cost of the production of gas was 1s. 3·04d. per 1000 cubic feet. Coke produced amounted to 52,718 tons, which was equal to 12·47 cwt. per ton of coal carbonized, exclusive of that required to heat the retorts. There are 48,362 prepayment meters in use, 8807 gas-cookers, 1310 hot-plates, 4276 grillers, 6676 rings—in all, 21,069 gas cooking appliances. Of fires, radiators, and geysers, there are 3867 in use.

The Directors of the Bothwell and Uddingston Gas Company, Limited, report a balance at the credit of profit and loss account, after charging all renewals, of £3144. Adding a sum of £1363 brought forward from the previous year, and deducting £186 for income-tax, there is available £4321, which the Directors recommend should be applied, to the extent of £2300, in paying a dividend at the rate of 10 per cent., that £1000 be added to the reserve, and that £1021 be carried forward. The capital expenditure during the year amounted to £1000 upon new mains and new meters. The capital account now amounts to £25,524. The revenue during the year was £12,035, of which £8232 was derived from the sale of gas, £95 from the hire of stoves (the whole of which is written off capital account), £2103 from coke, £520 from tar, and £1084 from sulphate of ammonia. The quantity of coal carbonized was 7400 tons, which cost, with £586 for cartage, £3625. The quantity of gas sold was 66,735,100 cubic feet. The manufacture of gas cost £6640, and distribution £1081. The total expenditure was £8891. There was produced 4600 tons of coke—670 tons used at works, and 3930 tons sold. Of tar, there was produced and sold 84,065 gallons, and of sulphate of ammonia 88 tons.

On Tuesday, the Town Council of Broughty Ferry met at the Corporation gas-works to inaugurate a new station meter. The meter, which is claimed to be the largest yet made of the cylindrical type,

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 655.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	Apl. 12	5	Alliance & Dublin Ord.	83—86	..	5 16 3	4,940,000	Stk.	May 12	9	Imperial Continental .	186—188	..	4 15 9
374,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	95—97	..	4 2 6	1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92—94	..	3 14 6
200,000	5	May 12	7	Bombay, Ltd. . . .	6¼—6¾	..	5 3 8	200,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c. .	119—121	..	4 19 2
40,000	5	,,	7	Do. New, £4 paid .	5¼—5½	..	4 17 5	561,000	Stk.	Feb. 24	10	Liverpool United A. .	214—216	..	4 12 7
59,000	10	Feb. 24	15	Bourne-) 10 p.c. .	28—29	..	5 3 5	718,100	,,	,,	7	Do. B. .	163—165	..	4 4 10
311,810	10	,,	7	mouth Gas) B 7 p.c. .	16⅛—16⅜	+⅛	4 3 7	306,083	,,	Dec. 30	4	Do. Deb. Stk.	102½—104½	..	3 16 7
75,000	10	,,	6	and Water) Pref. 6 p.c.	14⅜—15	..	4 0 0	75,000	5	Dec. 15	6	Malta & Mediterranean	4½—5	..	6 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	257—262	..	4 15 5	560,000	100	Apl. 1	5	Met. of) 5 p.c. Deb.	100—102	..	4 18 0
330,000	,,	,,	9½	Do. New . . .	202—207	..	4 11 9	250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	122—124	..	4 0 8	541,920	20	May 31	3½	Monte Video, Ltd. . .	12⅞—13⅛*	..	5 5 8
296,250	,,	Dec. 15	4	Do. 4 p.c. Deb. .	99—101	..	3 19 3	1,775,892	Stk.	Feb. 24	4¼	Newc'tle&G'tesh'd Con.	102½—103½	..	4 4 6
220,000	Stk.	Mar. 10	11	Brighton & Hove Orig.	217—220	..	5 0 0	529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	89—90	..	3 17 9
246,320	,,	,,	8	Do. A Ord. Stk. .	157—160	..	5 0 0	55,940	10	Mar. 10	7	North Middlesex 7 p.c.	14½—15½	..	4 10 4
490,000	20	Apl. 12	11⅞	British	43½—44½	..	5 5 7	200,000	Stk.	Apl. 27	8	Oriental, Ltd. . . .	137—139	..	5 15 1
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	96—98	..	4 1 8	60,000	5	Apl. 12	8	Ottoman, Ltd. . . .	6¾—7¼	..	5 10 4
109,000	,,	Feb. 10	6	Bromley, A 5 p.c. . .	116—118	..	5 1 8	31,800	53	Feb. 24	13	Portsea Island A . .	135—140	..	4 18 4
165,700	,,	,,	4½	Do. B 3½ p.c. . .	87—89	..	5 1 2	60,000	50	,,	13	Do. B . .	—	..	—
82,278	,,	,,	5½	Do. C 5 p.c. . .	106—108	..	5 1 10	100,000	50	,,	12	Do. C . .	120—125	..	4 16 0
55,000	,,	Dec. 30	3½	Do. 3½ p.c. Deb. .	84—86	..	4 1 5	114,800	50	,,	10	Do. D and E.	—	..	—
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	97—99	..	4 0 10	398,490	5	May 31	8	Primitiva Ord. . . .	7½—7¾*	..	5 3 3
100,000	10	—	—	Cape Town & Dis., Ltd.	3—4	..	—	796,980	5	Dec. 30	5	Do. 5 p.c. Pref. .	5⅝—5⅞	+3/16	4 8 11
100,000	10	—	—	Do. 4½ p.c. Pref. .	6—6½	..	—	488,900	100	June 1	4	Do. 4 p.c. Deb. .	97—99*	..	4 0 10
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	—	..	—	312,650	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	97—99	..	4 0 10
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	88—90	..	5 0 0	250,000	10	Mar. 24	9	San Paulo, Ltd. . . .	19—21	+1	4 5 9
157,150	Stk.	Feb. 24	5	Chester 5 p.c. Ord. . .	109—111	..	4 10 1	115,000	10	,,	6	Do. 6 p.c. Pref. .	12—12½	..	4 16 0
1,513,280	Stk.	,,	5,9/4	Commercial 4 p.c. Stk.	114—116	..	4 14 3	125,000	50	Jan. 3	5	Do. 5 p.c. Deb. .	50—51	..	4 18 0
560,000	,,	,,	5½	Do. 3½ p.c. do..	108—110	..	4 16 11	135,000	Stk.	Mar. 24	10	Sheffield A	235—237	..	4 4 5
475,000	,,	Dec. 15	3	Do. 3 p.c. Deb. Stk.	77—79	..	3 15 11	209,984	,,	,,	10	Do. B	235—237	..	4 4 5
800,000	Stk.	May 31	4	Continental Union, Ltd.	93—95*	..	4 4 3	523,500	,,	,,	10	Do. C	234—236	..	4 4 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	134—136*	+1½	5 2 11	70,000	10	Oct. 11	6	South African	9—10	..	6 0 0
492,270	Stk.	—	5½	Derby Con. Stk. . . .	122—124	..	4 8 9	6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	119—121	..	4 10 3
55,000	,,	—	4	Do. Deb. Stk. . . .	104—105	..	3 16 2	1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	80—82½	+½	3 13 2
148,995	,,	Apl. 12	5	East Hull 5 p.c. Ord. .	—	..	—	209,820	Stk.	Mar. 10	8	South Shields Con. Stk.	154—156	..	5 2 7
840,150	10	Jan. 27	10	European, Ltd. . . .	19—20	..	5 0 0	605,000	Stk.	Feb. 24	5½	S'th Suburb'n Ord. 5 p.c.	119—121	..	4 13 6
16,179,445	Stk.	Feb. 24	4⅜	Gas-) 4 p.c. Ord. . .	105¼—106¼	..	4 7 10	60,000	,,	,,	5	Do. 5 p.c. Pref. . .	118—120	..	4 3 4
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	85—87	..	4 0 6	117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	123—125	..	4 0 0
4,062,235	,,	,,	4	and) 4 p.c. Con. Pref.	102—104	..	3 16 11	502,310	Stk.	May 12	5	Southampton Ord. . .	109—111	..	4 6 11
4,531,705	,,	Dec. 15	3	Coke) 3 p.c. Con. Deb.	80—82	+½	3 13 2	120,000	Stk.	Feb. 10	7	Tottenham) A 5 p.c. .	147—150	..	4 13 4
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	95—97	..	5 3 1	483,940	,,	,,	5½	and) B 3½ p.c. .	116⅛—118⅛	..	4 12 10
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—	149,470	,,	Dec. 15	4	Edmonton) 4 p.c. Deb.	98—100	..	4 0 0
70,000	10	Apl. 27	11	Hongkong & China, Ltd.	17⅛—17⅜	+⅛	6 3 11	182,380	10	Dec. 30	8	Tuscan, Ltd.	9—9½	..	8 8 6
131,000	Stk.	Mar. 10	7⅜	Ilford A and C . . .	146—149	..	4 19 0	149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
65,780	,,	,,	5⅜	Do. B	115—117	..	5 0 5	246,476	Stk.	Feb. 24	5	Tynemouth, 5 p.c. max.	115—117	..	4 5 6
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb. . . .	96—98	..	4 1 8	255,636	Stk.	Feb. 24	6¼	Wands-) B 3½ p.c. . .	141—143	..	4 14 5
								85,766	,,	Dec. 30	3	worth) 3 p.c. Deb. Stk.	73—75	..	4 5 6

Prices marked * are "Ex. div."

has been constructed by Messrs. Alder and Mackay, of Edinburgh. It passes 300 cubic feet of gas per revolution; and at 100 revolutions per hour, the capacity is 30,000 cubic feet per hour. The meter was made to the specifications of Mr. G. Keillor, the Gas Engineer to the Corporation; and Mr. J. Hutton, of Messrs. Alder and Mackay, who was present at the inauguration ceremony, paid a high tribute to Mr. Keillor's genius, on account of many improvements which he suggested. After the inauguration of the meter, the councillors inspected various systems of automatic lighting and extinguishing of gas-lamps. The visitors showed a preference for the pressure system of Messrs. Alder and Mackay. Mr. Hutton, in a short address, referred to the success which the system had had in Newcastle and elsewhere. The labour saving by the apparatus is as 3 to 7.

One of the first questions which will require the attention of the Town Council of Kirkcaldy as Gas Commissioners will be the supply of gas to outlying communities. Thornton, several miles to the north of Kirkcaldy, is one of the places which is not yet possessed of a gas supply. The community there have applied to the Corporation; and their application came before the Gas Committee on Tuesday, and was favourably received. A Committee was appointed to confer with the representatives of the village as to terms.

The Directors of the Leven and Methil Gas Company, Limited, report that the balance at the credit of the profit and loss account, after providing for depreciation, amounts to £2711. They recommend that £1350 be set apart for the payment of a dividend of 7½ per cent., that £500 be placed to reserve account, and that £861 be carried forward. A new gasholder has been erected; and the Directors hope to have a sulphate of ammonia plant installed this year.

On the 23rd ult., there was published in the "Glasgow Herald" an article upon the subject of metallic filament lamps, which contained some statements that were not altogether to be accepted. I am glad to see that they are replied to by Mr. W. M. Mason, of the Gas Office in Glasgow, who, in the course of a letter to the Editor, published on Wednesday, controverted some of the statements made relative to gas and electricity.

Metropolitan Water Board's Proposed New Works.—At a special meeting of the Metropolitan Water Board held last Wednesday, it was decided not to oppose the passing of the Board's New Works Bill or the Thames Conservancy Bill. After carefully considering the whole of the circumstances, the Law and Parliamentary Committee felt that it would not be to the Board's advantage to suggest amendments to the Thames Conservancy Bill with the object of obtaining the provision they desired with regard to the gravel water and to the reduction of the minimum flow of the river at Teddington from 170 million gallons to 140 millions; and that there was no alternative but to leave with Parliament the responsibility for placing upon the Board the obligations which the decision of the Joint Select Committee would entail. The Committee's recommendation was adopted; an amendment to instruct Counsel to oppose the Thames Conservancy Bill and withdraw the Board's Bill being rejected.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 694.]

LIVERPOOL, *June 2.*

Sulphate of Ammonia.

The market has been without animation throughout the week, but there has only been a limited quantity offered for sale by makers for prompt delivery, and values have not receded much below those current a week ago. Although transactions are reported at less money, the nearest quotations at the close are £12 17s. 6d. per ton f.o.b. Hull, £12 18s. 9d. per ton f.o.b. Liverpool, and £13 per ton f.o.b. Leith. A good inquiry has again been experienced for future delivery; but manufacturers generally maintain a very firm attitude, and render first-hand business practically impossible. It is rumoured, however, that some of the middlemen are less conservative in their ideas, and that they are taking orders for both July-December and January-June delivery at a slight discount on prompt figures.

Nitrate of Soda.

The supply of this article on spot is still small, and holders refuse to accept less than 10s. and 10s. 3d. per cwt. for ordinary and refined qualities respectively.

LONDON, *June 2.*

Tar Products.

The markets for tar products have remained firm during the past week. There has been a little buying in pitch for both prompt and forward delivery; but at the present moment high prices are being asked in all quarters, which prevents business. Creosote is steady; and a few transactions have been reported in this article. Crude carbolic is very firm, and improved prices are stated to have been offered. Benzols are steady. Solvent naphtha is quiet; but there is a good demand for heavy naphtha.

The average values during the week were: Tar, 18s. to 22s., *ex* works. Pitch, London, 36s. 6d. to 37s.; east coast, 36s. to 36s. 6d.; west coast, Manchester, 35s. 6d. to 36s., Liverpool, 36s. to 36s. 6d., Glasgow 36s. to 36s. 3d., f.a.s. Benzol, 90 per cent., casks included, London, 9d. to 9⅛d.; North, 9d.; 50-90 per cent., casks included, London, 8¾d. to 9¼d.; North, 8½d. to 9d. Toluol, casks included, London, 9⅜d. to 10d.; North, 9¼d. to 9⅝d. Crude naphtha, in bulk, London, 4d. to 4½d.; North, 3¾d. to 3⅞d.; solvent naphtha, casks included, London, 11d. to 11⅜d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11½d. to 1s.; North, 10d. to 10½d. Creosote, in bulk, London, 2¼d. to 2⅝d.; North, 1⅝d. to 2d. Heavy oils, in bulk, 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 9d. to 1s. 9½d.; west coast, 1s. 8d. to 1s. 9d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1½d. to 2d. per unit, packages included and delivered.

The price given in last week's report for London creosote should have been 2⅛d. to 2⅜d., and not 3⅜d. as stated.

R. & J. DEMPSTER, Ltd.,

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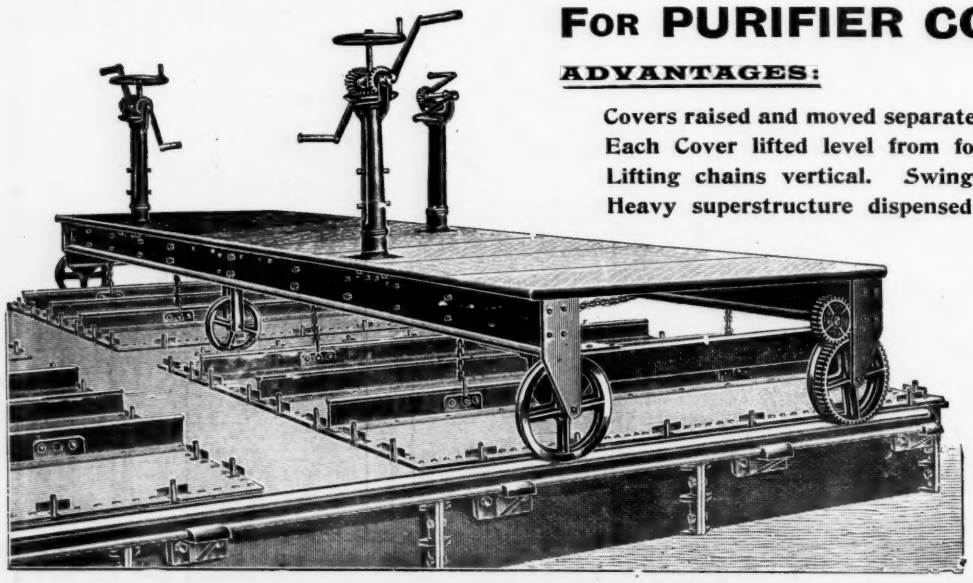

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Sulphate of Ammonia.

There has been a little more inquiry for this article towards the end, especially for forward delivery. To-day, actual Beckton is quoted £12 15s. Outside London makes are £12 7s. 6d. to £12 10s.; Hull, £13; and Liverpool, £13 to £13 1s. 3d. In Leith, £13 5s., and for forward delivery £13 10s., is quoted. In Middlesbrough, £12 18s. 9d. to £13 is asked.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been a more active demand in the last few days for both steam and gas coal, as often happens before holidays. The production has been heavy, and has been fully taken up. In steam coals, best Northumbrians are quoted from 10s. 2d. to 10s. 6d. per ton f.o.b., second-class steams are from 9s. 3d. to 9s. 6d., and steam smalls are from 5s. to 6s. 3d. In the gas coal trade, the scarcity which has been known for best kinds has made quotations firmer. Durham gas coals vary rather more in price. Best sorts are from 10s. to 10s. 1½d. per ton f.o.b.; and second qualities are from 9s. 3d. to 9s. 6d. For "Wear specials," from 10s. 6d. to 10s. 9d. per ton f.o.b. is near the current quotations. The demand should be relatively increased for gas coals for the next few weeks, when there will be a limitation of the output by the holidays. No contracts of moment are reported this week; but the tenders have been sent in for some 20,000 tons for the gas supply of Palermo, the result of which should be known shortly. Coke is quiet. The reduced production of gas coke has steadied its price; and good gas coke is 14s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade is more disappointing than ever. Orders are scarce, and prices have come down further than could have been anticipated. At present, there is no prospect of improvement. The prices now quoted are: Ell, 8s. 6d. to 9s. 6d. per ton f.o.b. Glasgow; splint, 9s. to 9s. 3d.; and steam, 8s. 9d. to 9s. The shipments for the week amounted to 331,677 tons—a decrease of 17,461 tons upon the previous week, but an increase of 448 tons upon the corresponding week last year. For the year to date, the total shipments have been 3,262,231 tons—a decrease upon the corresponding period of 3543 tons.

Gas-Works Results at Oldham.—Mr. Arthur Andrew, the General Manager, has reported to the Oldham Corporation Gas Committee that, subject to audit, the net profit on the undertaking for the past financial year is £23,574. Of this, the sum of £7500 goes in aid of the rates, and £6700 to the reserve fund, to meet extraordinary expenditure, leaving a balance of some £9000. The Chairman (Alderman H. Wilde) said the year's working had been very satisfactory.

Leatherhead Lighting Contract.

At the last fortnightly meeting of the Leatherhead Urban District Council, consideration was given to the tenders for street lighting. The Leatherhead Gas Company offered to light the 168 public lamps for a period of three years for the sum of £3 1s. 6d. per lamp per annum, or for five years at £3 per lamp per annum; the lamps to be lit within an hour after sunset, and none to be extinguished before 1 a.m. The Electricity Company submitted four alternative tenders as follows: (1) To light the 168 public lamps for a period of ten years for the sum of £2 19s. 6d. per lamp per annum; (2) to light 84 lamps within a certain area for a period of five years for the sum of £2 17s. per lamp per annum; (3) to light 84 lamps within a certain area for a period of seven-and-a-half years for the sum of £2 14s. per lamp per annum; (4) to light 84 lamps within a certain area for a period of ten years for the sum of £2 10s. per lamp per annum. It was stated that the last contract with the Gas Company was for five years, at £3 6s. 6d. per lamp. One member pointed out that there would be two hours less lighting a day by the Electricity Company than by the Gas Company. The Chairman (Mr. T. J. Leavey) said he thought that in the past the town had been as well lit as any he had visited; and considering the standard of light they had always had, and the substantial reduction that had been made, he should move that the Gas Company's tender for five years at a sum of £3 per lamp be accepted. This was carried unanimously.

Progress at Stourbridge.—The Chairman of the Gas Committee (Mr. S. Fiddian) has informed the Stourbridge Urban District Council that there is a net profit on the past year's working of £3005, which constitutes a record. He added that since the Council took over the undertaking in 1892, it had progressed continuously. In the year named, the make of gas was 81 million cubic feet, the consumers numbered 1340, and the mains were 37 miles in length. Last year, the make of gas was 204 million cubic feet, the consumers numbered 11,380, and the mileage of mains was 57. The extension of the mains to Clent had proved very satisfactory; and they were now increasing their area to Belbroughton.

Evesham Gas Profits.—Addressing the Evesham Town Council, Alderman Fisher, the Chairman of the Gas Committee, referring to the operations of the gas undertaking during the past financial year, said the output of gas had gone up from 46 to 48 million cubic feet; while the number of consumers had increased by 92. The revenue account showed that the expenditure amounted to £6721, and the receipts (after deducting discounts) to £9643; leaving a gross profit of £2922, which was £433 more than for the previous year. The net profit amounted to £1833. Only one more instalment was required to complete the repayment of the loan of £4000 taken up in 1882; and when this had been paid, he hoped the Committee would be able to sell gas at such a figure that every cottager would use it.

PAPER BAG COOKERY.

EXPERT OPINION

is agreed that Paper Bag Cookery, or any other kind of Cookery, is best accomplished in a "MAIN" Cooker.

Many Gas Cookers are disappointing to the user, especially as regards the oven. The ovens of the "MAIN" Cookers are so designed as to give the necessary top heat so essential to successful baking,

This is only one of the many reasons why "MAIN" Cookers appeal to your consumers.

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THE "CORONATION" COOKER.

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SHOW-ROOMS: 25, Princes St., Oxford Circus, W.; 136, Renfield St., GLASGOW; 56, Broad St., BIRMINGHAM; 83, Old Market St., BRISTOL; 13, Whitworth St. West, MANCHESTER; and 333, Queen St., MELBOURNE.

Bungay, Harleston, and Eye Water Company.—The adjourned general meeting of shareholders in this Company, which, as mentioned in the "JOURNAL" last week (p. 609), was convened for last Tuesday, "to receive the report from the Auditors appointed by the shareholders on Feb. 1 last," had to be adjourned, in consequence of failure to form a quorum.

Reduction in Price at Blyth.—The Directors of the Blyth and Cowpen Gas Company give notice that, as and from the meter indices which will be taken this month, the price of gas will be reduced to all ordinary consumers 2d. per 1000 cubic feet—viz., from 2s. 8d. to 2s. 6d. per 1000 cubic feet, less a discount of 5 per cent. upon the amount for gas supplied, provided the same is paid on or before the specified date each quarter. The discounts to large consumers will be continued as heretofore.

Hire of Gas-Stoves in Leeds.—As mentioned last week, the Leeds Corporation Gas Committee have revised the conditions under which gas-stoves are let out on hire; and if the City Council agree to the new proposals, the arrangement will be as follows: That in future cookers be let on hire at a rental of 10 per cent. per annum on the cost price, payable quarterly in advance, such rent to cover the cost of fixing, with the option exercisable at the end of the first year's hire of purchasing the same on payment of the cost price as shown in the books of the Corporation, less the quarterly sums paid for hire; and that in the event of any cooker being kept by the hirer for a less period than twelve months, the hirer be required to repay the cost of fixing.

Staffordshire Potteries Water Company.—At the sixty-fifth annual meeting of the Staffordshire Potteries Water-Works Company, a dividend was declared at the rate of 11 per cent. per annum on the consolidated ordinary stock, and of 7 per cent. per annum on the consolidated new ordinary stock. It was also decided to pay a special dividend of 2s. per cent. on the £50,000 consolidated ordinary stock issued up to Sept. 29, 1896 (all issues since that date having received the maximum dividend), to make up the deficiency of previous dividends which have fallen short of 7 per cent. The Directors' fees were increased from £750 to £1000 per annum; and the action of the Board in increasing the salary of the Secretary (Mr. Horace J. Wilden) by £50 a year was approved.

Sale of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold by auction £6100 of 4 per cent. perpetual debenture stock in the Aldershot Gas, Water, and District Lighting Company at from £100 to £100 10s. per £100 of stock. They also disposed of 10 £25 "D" ordinary shares in the Dorking Gas Company, at £25 per share; 200 £10 fully-paid ordinary shares in the South Kent Water Company, at £5 to £5 5s. per share; 55 £10 fully-paid "B" shares in the Tendring Hundred Water-Works Company, at £11 5s. per share; and the following stocks in the Horley District Gas Company: £500 of 5 per cent. preference stock at par, £100 of "A" capital stock at par, and £80 of additional "B" stock at the rate of £70 per £100 of stock.

Successful Gas Exhibition at Bangor.—A gas exhibition was recently opened in the Penrhyn Hall, Bangor, by Mr. W. Bayne, the Chairman of the Gas Committee of the Corporation, who spoke of the developments which have taken place in regard to the uses of gas for cooking, &c. Owing to the energy of the Gas Manager (Mr. Price F. White), upwards of 72 cookers were sold; and he is to be congratulated on the excellent results achieved.

Hot-Water Systems.—About a hundred of the Bournemouth Gas Company's staff assembled at the Company's gymnasium on the 24th ult., to hear a lecture on hot-water work, delivered by Mr. Frederick Dye (of Messrs. John Wright and Co.); the meeting being presided over by the Engineer and Manager of the Company—Mr. H. W. Woodall. Considerable attention was given, as the lecturer dealt so thoroughly with the details of the work.

Visitors to London Overpowered by Gas.—Last Thursday morning, five young men, who, with some companions, were up in London for the Derby, were found unconscious at a hotel in the Westminster Bridge Road, having been overcome by gas. They were removed to St. Thomas's Hospital, where two had to be detained; the others being able, after treatment, to return to their lodgings. The suggestion is that one of the party accidentally turned on the gas-tap when hanging up his coat.

Devonport Corporation Water-Works.—The accounts of the Devonport water undertaking for the year ended March 31 last show that the total revenue was £21,892, of which £20,950 was from water-rentals. Working expenses amounted to £7272; and out of the balance of £14,620, payments were made for interest, &c., to the amount of £12,003—leaving £2617 to be carried to the reserve fund. This brings the reserve to a total of £8882. The Corporation took over the undertaking in 1907, and since then have spent more than £50,000 in new works and improvement of the supply. One effect of this is seen in the increased quantity of water supplied, which has risen from 2,261,360 gallons to 3,182,737 gallons per day, or from an average of 32·30 gallons per head of the population to 42·43 gallons per head.

Tisbury New Water-Works.—The ceremony of cutting the first sod in connection with the new water-works scheme for Tisbury and district was performed yesterday week by Mr. E. E. Hibberd, the Chairman of the Water Committee of the District Council. After Mr. Hibberd had been thanked for his services, Mr. Mackenzie Richards, the Engineer, spoke of the long-felt want of such a scheme, and the great benefits that will be derived from it throughout the district. He said that the water-works, which have been designed for an increased population, will embrace about 12 miles of mains. The water will be collected at the springs to the south of Lower Lawn Farm House, and from there will be pumped by gas-engines through a 7-inch main to the covered storage reservoirs. The contract has been entrusted to Messrs. A. Streeter and Co., of Guildford, whose tender was £10,100. The works have to be completed within twelve months. Mr. Richards heartily congratulated the people of Tisbury on being able to find such excellent water so near home.

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LAUNCHED is a word often noticed and applied to great efforts and enterprise when the initial difficulties have been mastered. It aptly describes the position of our Water Heater business to-day. Scientifically, Commercially, and Practically we have moved in this departure in a manner that is gaining for us the confidence of the Gas Undertakings throughout the world. Since our first advertisement, inquiries reach us not only from all parts of the British Isles, but from Abroad, showing the interest aroused in this important subject. Standardization is the hub of our manufactures and machinery of the finest and most modern kind is producing the goods we are advertising. Trained expert staff both to make and to sell. We are in for a big business, and are ready for it.

Success is assured. Inquiries welcomed.

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"The Trent"

Supplies hot water to any part of the house.

A test of our Water Heaters will give High Efficiency Results surprising to you.

May we send Sample?

THE RICHMOND GAS STOVE & METER CO., LTD.

Water Heater Specialists,

WARRINGTON and LONDON.

Proposed Sale of the Lymm Water-Works.—Mr. W. H. Lever, who recently purchased what is known as the Lymm Estate, has now offered to sell to the Lymm Urban District Council the Lymm Water-Works, which were part of the purchase, including the Lymm dam, the water from which drives the water-works turbines, together with some adjoining land, part of which might be utilized for a park. The price has been fixed at £27,000. Some years ago, when the Council were negotiating for the purchase of the water-works, £14,000 was named as the possible figure at which the undertaking could be acquired.

Fire at the Newport (Mon.) Gas Company's Works.—A fire broke out last Thursday night at the Mill Street station of the Newport (Mon.) Gas Company, as the result, it was supposed, of a slight explosion in the governor-house. The Engineer (Mr. Thomas Canning) lost no time in cutting off the gas here, and turning on the town supply through the Crindau works. Damage to the extent of between £300 and £400 was done; and the foreman who turned the valves was burned about the face and hands. A noteworthy point is that practically the whole of the gas-works employees assembled on the scene from all parts of the town in a very short time, and rendered valuable assistance in extinguishing the flames.

Wages Dispute at Nottingham.—A dispute in Nottingham which has arisen over a demand by the builders' labourers for an increase in wages, led to a special meeting of the City Council last Wednesday for the purpose of deciding what action the Corporation should take in regard to the men of this description in the employ of the Gas Committee. The Chairman of the Committee (Mr. A. Ball) submitted a resolution to the effect that the Council should concede an increase from 6½d. to 7d. per hour; but at the close of a long discussion, the Council decided to maintain a neutral attitude in the dispute. That is to say, they will stand aside while the matter is fought out between the Building Trades Employers' Association in the city and the employees; and then if the increase is conceded by the masters generally, the Corporation will give their bricklayers' labourers the 7d. demanded.

As the result last Wednesday night of a gas explosion in Bank Street, Sunderland, it is reported that some portion of the pavement was blown up. A house near the scene of the occurrence took fire; and considerable damage was done before the flames were extinguished by the fire brigade.

Messrs. C. & W. Walker, Limited, of Donnington (Salop) forward a copy of their new gasholder catalogue, which contains a number of photographic illustrations of different types of holders erected by them in the United Kingdom and abroad. Some of these have guide-framing, and others are spiral-guided. Details are also given of special ladders and carriages for holders of the latter type. At the end of the book, there is a list of gasholders made and erected during the past few years; and from this it will be gathered how extensive is the work done in this particular branch of the firm's business.

A Cheltenham cabinet maker named Sparrow was found dead on his bed some days ago, under circumstances which led the Coroner's Jury to find that he committed suicide by inhaling coal gas while of unsound mind. The window and door had been closed, and all the cracks stuffed with bedclothes to prevent the escape of gas, which had been turned on full at the burner and brought within a few inches of deceased's face by means of a flexible piece of tubing attached to the burner at one end, and tied to the bedstead-rail at the other. The whole house was full of gas, though none was actually escaping from the pipe at the time of the discovery, as the supply through the penny-in-the-slot meter had given out.

A Handsome F'Cap Volume giving a complete account of the

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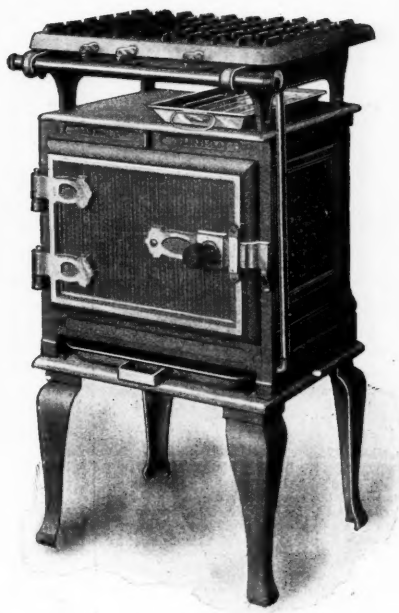

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TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending June 3. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar crude	per ton	—	18/6 21/6	18/6 22/-	19/- 21/3	19/- 21/3	—
Pitch	„	38/-	36/-	36/-	37/3	36/6	36/-
Benzol, 90%	per gallon	—	-/9	-/9	-/9½	-/9⅝	-/9
Benzol, 50-90%	„	—	-/9¼ -/9½	-/9½	-/8¾	-/8¾	—
Toluol, 90%	„	—	-/9¾ -/10	-/10	-/10	-/10	-/10
Crude naphtha, 30%	„	-/4½	-/3¾	-/4	-/3⅝	-/3⅝	—
Light oil, 50%	„	—	-/3½	-/3¾ -/4	-/3⅜	-/3½	—
Solvent naphtha, 90-160	„	—	-/10	-/10	-/9⅝	-/10	-/11
Heavy naphtha, 90-190	„	—	-/11	-/11½	-/10¾	-/11	-/11
Creosote in bulk	„	-/2⅛	-/2⅛	-/2	-/2⅛	-/2 1/16	-/1⅞
Heavy oils	„	—	-/2⅛ -/2⅝	-/2¼	-/2⅝	-/2¾	-/2⅝
Carbolic Acid, 60's	„	—	1/8 1/8½	1/9	1/8	1/7½	1/8
Naphthalene, crude drained salts	per ton	—	42/6 45/-	40/- 42/6	45/-	47/6	—
„ pressed	„	—	60/-	63/-	60/- 62/6	60/- 72/6	—
„ whizzed	„	—	—	—	67/6	60/- 75/-	61/-
Anthracene	per unit	-/2	-/1¼	-/1½	-/1¼	-/1½	—

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ASSISTANT. No. 5410.
FITTER AND MAINTENANCE MAN. Weston-super-Mare Gas Company.
WATER INSPECTOR. No. 5412.
SHOW-ROOM ASSISTANT. Gosport Gas Company.
LABORATORY ASSISTANT. No. 5413.
SECRETARY. Windsor Gas Company. Applications by June 14.

Situations, &c., Wanted.

SULPHATE PLANT REPAIRER, &c. Davies, Shepherd's Bush.

Plant, &c. (Second-Hand), For Sale.

GAS VALVES. No. 5411.
EXHAUSTERS, ENGINES, PUMPS, BOILERS, TANKS, BARROWS, RAILS, PIPES, MOUTHPIECES, GOVERNORS, PURIFIERS, WASHERS, MAINS, &c., &c. Gaslight and Coke Company, London. Tenders by June 16.
METERS. Gaslight and Coke Company, London.
PURIFIERS, WASHER AND ENGINE, SCRUBBERS, &c. Cambridge Gaslight Company.

Plant, &c. (Second-Hand), Wanted.

GASHOLDER. 5414.

Patent for Disposal, &c.

METER FOR COMPRESSED GAS OR AIR. Haseltine, Lake, and Co., Chancery Lane, W.C.

Meeting.

INSTITUTION OF GAS ENGINEERS. Glasgow and West of Scotland Technical College, June 13 to 15.

Stocks and Shares.

BARNET GAS AND WATER COMPANY. June 13.
DARTFORD GAS COMPANY. June 13.
GREAT YARMOUTH WATER COMPANY. June 13.
WESTGATE AND BIRCHINGTON WATER COMPANY. By Auction. June 13.

TENDERS FOR

Acid, &c.

CHORLEY GAS DEPARTMENT. Tenders by June 20.

Benzol.

ILFRACOMBE GAS COMPANY. Tenders by June 22.

Coal and Cannel.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 14.
AUDLEY URBAN DISTRICT COUNCIL. Tenders by June 13.
GOOLE URBAN DISTRICT COUNCIL. Tenders by June 28.
HEYWOOD GAS DEPARTMENT. Tenders by June 17.
ILFRACOMBE GAS COMPANY. Tenders by June 22.
ILKESTON GAS DEPARTMENT. Tenders by June 12.
MANSFIELD GAS DEPARTMENT. Tenders by June 27.
OSSETT GAS DEPARTMENT. Tenders by June 26.
SALISBURY GASLIGHT COMPANY. Tenders by June 12.

Coal and Cannel (*continued*)—

SPALDING GAS DEPARTMENT. Tenders by June 14.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 13.
TODMORDEN GAS DEPARTMENT.

Coke.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 13.

Lime.

MANSFIELD GAS DEPARTMENT. Tenders by June 27.

Oxide (New and Spent).

COWES GAS DEPARTMENT. Tenders by June 17.
EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by June 12.

Tar and Liquor.

ACCRINGTON GAS AND WATER BOARD. Tenders by June 13.
BRIERLEY HILL GAS COMPANY. Tenders by June 12.
CHORLEY GAS DEPARTMENT. Tenders by June 20.
EASTBOURNE GAS COMPANY. Tenders by June 8.
GOOLE URBAN DISTRICT COUNCIL. Tenders by June 28.
MANSFIELD GAS DEPARTMENT. Tenders by June 27.
READING GAS COMPANY. Tenders by June 20.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 13.

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